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THE TREATMENT OF TYPHOID FEVER.

JAMES BARR, M.D.

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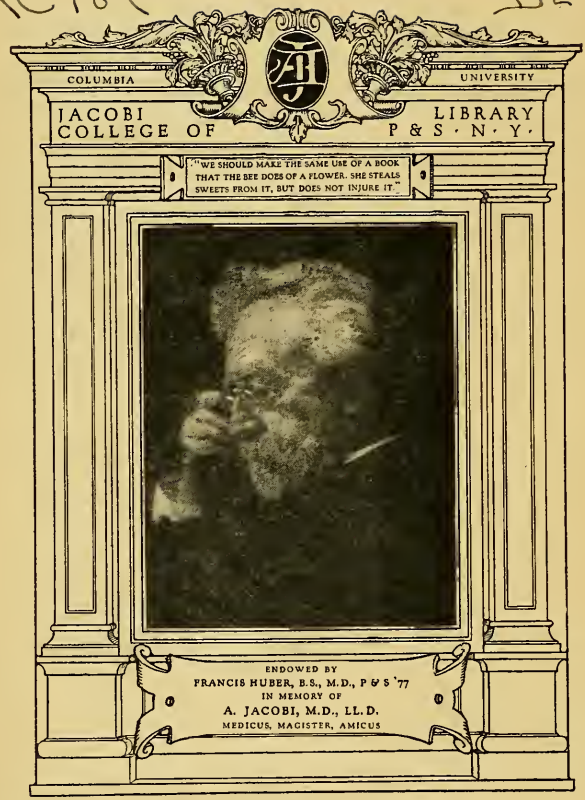
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THE

TREATMENT

OF

TYPHOID FEVER,

AND REPORTS OF FIFTY-FIVE CONSECUTIVE CASES,

WITH ONLY ONE DEATH.

BY

JAMES BARR, M.D.,

PHYSICIAN TO THE NORTHERN HOSPITAL, LIVERPOOL;
MEDICAL OFFICER OF HER MAJESTY'S PRISON, KIRKDALE, ETC.

INTRODUCTION

BY

W. T. GAIRDNER, M.D., LL.D.,

PROFESSOR OF MEDICINE IN THE UNIVERSITY OF GLASGOW; LECTURER ON CLINICAL MEDICINE, AND PHYSICIAN TO THE WESTERN INFIRMARY, GLASGOW; PHYSICIAN TO THE QUEEN IN SCOTLAND.

LONDON:
H. K. LEWIS, 136, GOWER STREET, W.C

1892.

RC
187
.B57
1891

LIVERPOOL:

PRINTED BY S. HILL AND CO., COLLEGE LANE.

TO

WILLIAM TENNANT GAIRDNER, M.D., LL.D.,

IN SINCERE ADMIRATION OF HIS QUALITIES AS A PHYSICIAN, A CLINICAL TEACHER, AND A PIONEER IN ADVANCING THE TREATMENT OF FEVERS, THIS WORK IS

Dedicated,

WITH EVERY SENTIMENT OF AFFECTION AND ESTEEM BY HIS PUPIL AND DEVOTED FRIEND—

THE AUTHOR.

INTRODUCTION

BY

W. T. GAIRDNER, M.D., LL.D.

I TRUST it will not be supposed that in acceding to the earnest request of Dr. Barr that I should write a few remarks as an introduction for his book, I am at all under the impression that I can do so with authority, or, indeed, with any other object in view than to give a perfectly sincere expression to my regard for an old pupil, who has, in the course of years, and even according to the internal evidence in this work, arrived at a position so independent and so entirely his own, as no longer to require a recommendation. There was, indeed, one occasion since his studentship, on which it was possible for an old teacher to say an effectual word on behalf of Dr. Barr. A member of the House of Commons, forgetful of the restraints which, in an assembly of gentlemen, are usually considered essential in commenting on personal character, had allowed himself the privilege of making a violent and unfair attack on Dr. Barr in respect of a public duty thoroughly well performed, but which happened to be disagreeable to some of the honourable member's friends. The words might have been actionable, had they been spoken elsewhere than in the House. No one who knew Dr. Barr believed them to be true. But being thus spoken, the effect on the minds of his medical brethren in Liverpool was such, that a document, signed by 187 of them, was at once forwarded to the Secretary of State, as a perfectly spontaneous expression of the indignation felt by the signatories as regards this unprovoked and most reprehensible attack, and of their high appreciation of the character which had been thus injuriously assailed. One who is held in so much esteem where he is best known, is in no need of further testimonials; but I had the opportunity then, as I have now, of declaring that Dr. Barr was, in his day, a most distinguished

student of Glasgow University; and that his career since he left us has been such as to inspire confidence, not only in his rectitude of purpose, but in his accuracy of statement in detail, and in his highly-cultivated practical sagacity. As regards the present work, I venture to think that these qualities are sufficiently apparent, and will commend themselves to all well-informed readers.

These general statements will not, I suppose, be held as committing me on all points, or even on any one point, to an entire acceptance of Dr. Barr's views, either theoretical or practical. But, in consideration of the cautious and even (as some have thought) unduly sceptical attitude I some years ago* adopted as regards the so-called antipyretic treatment of the specific fevers, it is not at all displeasing to me to have to confess that Dr. Barr's researches, and also certain modifications of detail and even (I think) of principle, which are apparent in the more recent work of Liebermeister, on "Antipyretic Methods of Treatment,"† have done much to remove my difficulties, and to present these methods under forms which justify them, to my mind, as very probably deserving of adoption. It seems now to be conceded that the cumulative proceedings formerly regarded as absolutely indispensable for safety, whenever the axillary temperature reaches 39° C., are no longer in favour, and are, indeed, both distressing and dangerous. Veratrum and even digitalis are all but discarded, and even the very large and frequent doses of quinine are (to judge from the tables) comparatively little employed. Baths are used chiefly at night, so as to come in aid of the normal remissions, and only so as to secure a considerable remission once in the twenty-four hours, not a continuous lowering of the temperature. More than a half of the cases are now treated either without any very active measures, or with baths alone; and nearly a quarter of them "entirely without the stronger antipyretic methods," *i.e.*,

* *Glasgow Medical Journal*, vol. x., N.S. 1878, pp. 416, 503; also *British Medical Journal*, 1884, vol. ii., p. 1125.

† In Von Ziemssen's "Handbook of General Therapeutics," vol. ii., translated by Matthew Hay, M.D., 1885.

even without baths.* It is impossible to avoid observing here, either that Professor Liebermeister's views have undergone a change amounting to a revolution, or that the expressions employed in his earlier monograph were very misleading. In either case, I see no reason to regret having issued my "Cautions" in 1878. The evils that I apprehended are now, at least, admitted, and are practically reduced to a minimum.

But now Dr. Barr comes to the front with a new proposal which, whatever its ultimate fate, may be accepted in the meantime as one well deserving of attention, and more logical, I think, than the newer German position. If the reduction of temperature by the abstraction of heat is an object of so great importance, why not do it continuously, but in such a way as shall cause no distress at the time, shall avoid violent transitions, and allow of natural rest, and, as far as possible, a normal periodicity of all the functions, undisturbed by the perpetual interference at all hours of the day and night, which characterised the earlier antipyretic methods? The objection to these, with many of us, lay in the points summed up as follows, in my reply to Liebermeister, viz :—That the rules set forth in his earlier article required the constantly repeated bathings to be "carried to the verge of collapse-temperatures, so as in many cases to make stimulants needful for checking further descent; that even sleep at night is to be disturbed in order to give these baths" (and this without the day-interval for repose which he now not only permits, but enjoins); "and that, besides this systematic interference by night as well as by day, the failing appetite and powers of nutrition of the patient are to be taxed by giving enormous cumulative doses of the strongest, and, in some cases, actively poisonous, drugs; which, again, are to be pushed even to the point of *vomiting*, so as to require the use of stimulants for restorative purposes."† These objections may seem to have been, more or less

* Compare Op. cit. p. 125, *et seq.*, and the Tabular Statements in pp. 143-4, with the previous Monograph of Liebermeister, on Typhoid Fever, referred to by me in 1878.

† *Glasgow Med. Journal*, *ubi supra*, p. 504.

effectually, obviated in the more recent practice of Liebermeister himself; but they are more logically and completely met, as it seems to me, by the proposal now set forth by Dr. Barr. Indeed, I have held all along, and have taught, that if heat-abstraction is permanently to be adopted as an essential part of the treatment of pyrexia, it ought to be in the form which Stokes advocated in small-pox, and Hebra in pemphigus. To Dr. Barr will accrue all the credit of a first experiment in this direction; an experiment at once bold and cautious, on a sufficient scale to command attention, and with results which cannot easily be explained away. More than this, it would, perhaps, be inexpedient at present to affirm; but in the working out of this valuable experiment, I have no hesitation in saying that the reader will find in the details many side-lights upon the progress and course of enteric fever, which will tend to confirm, or to create, confidence in Dr. Barr's methods, and in his narrative of events.

I have now discharged to the best of my ability, the duty that has been laid upon me; and I have only, in conclusion, to deprecate the extremely complimentary terms in which Dr. Barr has alluded to my own labours, for which I have never claimed any higher rank than that they were directed to the re-instating of principles of treatment that had been at one time lost sight of; and to the correction of abuses which, according to the most enlightened medical opinion, had extensively prevailed, and were perhaps tending even to increase in 1864. My sole ambition was, in the interests of humanity, to state the grounds for maintaining these principles and staying these abuses, not as matters of controversy, but rather so as to make controversy difficult, or impossible. And in this respect, at least, my efforts may be said to have succeeded. But I have never claimed any originality, or any special credit, in these papers; which it seemed to me to be only the duty of a teacher of medicine to write, not as subserving his own reputation, but simply as vindicating his oral instructions, which Dr. Barr, no doubt, as an attached pupil, remembers with more appreciation than they have deserved.

GLASGOW, *December*, 1891.

PREFACE.

In introducing the tank, or continuous bath, in the treatment of severe cases of Typhoid Fever, I am fully cognisant of the difficulties which would attend its general adoption; but these difficulties are not insuperable, either in public or private practice, and, where human life is concerned, I am of opinion that no obstacles should be allowed to impede our path. A good many cases of Typhoid Fever are permitted to die from want of taking sufficient trouble to keep them alive. This may seem a bold statement, for one who has fully recognised the value of expectant treatment, to make, but I am convinced of its accuracy. Expectancy, when rationally carried out, answers admirably in a large number of cases, but it should never be allowed to degenerate into *laissez faire*.

Since this work was completed, I have had another death from Typhoid Fever, complicated with double pneumonia; but I have also had sixteen more cases—the majority of which have been of marked severity—so my mortality now stands at two deaths in seventy-one cases.

Owing to the low vitality of many patients, the neglect of early treatment, and the complications which frequently arise in Typhoid Fever, there must always be a certain mortality under any system of treatment; but our duty is plainly to reduce the death-rate as nearly as possible to the vanishing point. I feel firmly convinced that a lessened mortality may be expected to follow the adoption of the recommendations which I have sketched out in this work; but I should much dread the adoption of the tank treatment by any one who is not prepared to take the trouble to see it intelligently carried out.

To our public-spirited Committee of the Northern Hospital I am under many obligations, for affording me every facility for carrying out this treatment. To my friend and senior colleague, Dr. E. H. Dickinson, and to many other medical men, I am much indebted, for kindly placing patients under my care. To Drs. Milligan, Macadam Wallace, Cuming Askin, and Brooks, who have, in succession, held the office of House Physician at the Northern Hospital, my best thanks are due, as without their able and hearty co-operation it would have been impossible for me to have carried out the numerous observations on which this work is based. My reports of the cases are to a large extent abstracts from their copious notes. And to our excellent staff of nurses, who would reflect credit on any Institution, my gratitude must be warmly expressed for their untiring zeal and the lively interest which they have taken in all the patients. Without drawing any invidious distinctions, I must specially mention our head nurses, Miss Duckett, Miss Eardley, Miss Fletcher, and Miss Lloyd, as the intelligent and trustworthy manner in which they have had all my instructions carried out has been worthy of the highest praise. In the treatment of Typhoid Fever, good nursing is one of the most important factors, and those who read this work will find that, in my opinion, good nursing involves the carrying out of a great many details.

Liverpool, *December*, 1891.

CONTENTS.

PAGE

DEDICATION III

INTRODUCTION, BY PROFESSOR GAIRDNER V

PREFACE IX

INTRODUCTION 1

A HISTORY OF THE TREATMENT OF THE CONTINUED FEVERS FROM THE TIME OF SYDENHAM 7

DIAGNOSIS 38

THE TREATMENT OF TYPHOID FEVER 43

THE TREATMENT OF COMPLICATIONS 77

TABULAR STATEMENT OF FIFTY-FIVE SUCCESSIVE CASES OF TYPHOID FEVER WITH ONLY ONE DEATH ... 84

CASES TREATED IN THE TANK 86

TEMPERATURE CHARTS 169, 170

CASES TREATED WITH THE WET-PACK, ETC. 171

CASES SYMPTOMATICALLY TREATED 195

INTRODUCTION.

In the treatment of any disease it should always be recollected that it is the patient rather than the disease that the medical attendant is called upon to treat, and when I entitle this work, "The Treatment of Typhoid Fever," it is not to be supposed that I in any way depart from this principle. The character and severity of all acute diseases vary very much in different cases, so that there will always be free scope for individualism in medical practice, not merely so far as the individual physician is concerned, but also in respect of every individual patient. I am strongly averse to any routine system of treatment, and, therefore, if in the following pages I seem to advocate such a system, it is because common factors are present in a large number of cases of the disease of which I am about to treat.

In dealing with any disease it is most important to have a good knowledge of its pathology, and with respect to the pathology of typhoid fever there is a fair unanimity of opinion; it will therefore be quite unnecessary for me to divert the attention of my readers from the subject matter of this work to one on which we are all agreed. The diagnosis of typhoid fever is often a matter of some difficulty, and frequently it is only by a process of elimination that we can arrive at any certainty in the matter. I shall refer to this question later on. Mild cases of typhoid fever require very little treatment and should all do well, but the new method of treatment which I have been carrying out is chiefly applicable to the more severe cases, and, therefore, its merits can be readily tested. It is from the latter class that the mortality of the disease is chiefly derived, and any treatment which lessens the death rate has much to commend it.

Typhoid fever is a disease from which no class of the community is exempt, and therefore any suggested improve-

ment in its treatment must interest all those who are actively engaged in general practice, and especially attract the attention of those who have largely got to deal with this disease. In England and Wales during the past ten years the average annual number of deaths from this disease has been 5922. In *The Liverpool Medico-Chirurgical Journal*, July, 1889, Dr. Hope informs us that in Liverpool alone the number of deaths "during the last ten years average 129, fluctuating within comparatively narrow limits." These figures show, to my mind, that there is great room for improvement, not merely in preventive but also in curative medicine, and therefore I need offer no apology for troubling the medical profession with a mode of treatment which, in my opinion, offers fair prospects for at least lessening the mortality of typhoid fever. No doubt, as "prevention is better than cure," it would be much better if sanitarians could wipe out the cause of the disease, but as there is every reason to believe that it will be a very long time before sanitation has arrived at such a state of perfection, those of us who are actively engaged in the treatment of disease must exercise our best judgment not only in lessening mortality but also in restoring our patients to perfect health

I have not the slightest intention of attempting any complete historical sketch of the various evolutionary phases in the treatment of fevers—and it would be quite impracticable to separate typhoid from the other continued fevers, as it is only within a generation that a specific distinction has been drawn—but a work of this kind would be very defective, which did not take into account what has been done by our predecessors. The progress has not been uniformly in the right direction, and even in the present day we seem to be oscillating between expectancy and active medication.

In this country much of the improvement has been attained by what has been termed "armed expectancy," a good deal of which armament consists in a fair amount of common sense, but in the present day there is such a temptation to experiment with a whole host of new antipyretic, and antiseptic remedies, that I am afraid patients sometimes stand

in greater danger from the treatment than the disease. Certainly, it would have been well if some of the antipyretic drugs had never been manufactured. In 1886, when writing about one of the best of these drugs, antipyrin, I spoke against its regular use in the continued fevers, "as it in no way modifies the progress of the disease, and as it is questionable how far a mere reduction of temperature is beneficial, it should be held in reserve as an agent at hand to combat hyperpyrexia." I have since seen no reason to alter the view then expressed, and regarding many of the other new antipyretics I would be sorry to speak so favourably. Those who look upon all the evils of fevers as chiefly due to the pyrexia, must find in these remedies very efficient weapons, but the handling of which has not, unfortunately, produced very satisfactory results.

Formerly the cause of fevers was looked upon as a *materies morbi*, an entity, which required to be eliminated by blood-letting, emetics, diaphoretics, and purgatives. Now our energies are expended in a different direction; we attempt to kill the bacilli, which may seem an excellent method, and from a sanitary point of view almost command universal adoption, but where we have got to cure our patients as well as to kill the bacilli, we find that the latter task is not so easily accomplished. Though the bacilli are short lived, and evoke changes which tend to their own extinction, yet during the short period of their existence they are very tenacious of life, and it is usually more difficult to kill them than their host. Dr. Cash showed how anthrax might be prevented by the use of the perchloride of mercury, but when this and most other infectious diseases are established our efforts to kill the bacilli are futile, and the most we can do is to enable the patients to survive the attack of these microscopic myrmidons.

Pasteur has admittedly been very successful in preventing the development of hydrophobia by his inoculations with attenuated virus; as a means of rendering the body immune against that dreadful disease, the treatment is somewhat comparable to that of vaccination. More recently Koch has advanced another principle of treatment, with immediate

reference to tuberculosis, but which, no doubt, he hopes to extend to other infectious diseases. He proposes a very powerful product, tuberculin, of the tubercle bacilli, as a specific for tubercular tissue, if not for tubercular disease. The principle of treatment has so little to commend itself to my mind that I have not used it, but contented myself with reading the literature of the subject, and observing a few cases under the care of medical friends. It appears to me that severe cases of phthisis have within themselves good laboratories for the manufacture of tuberculin, and they get the "febrile reaction" (which has recently produced a form of wild delirium in the medical profession), every afternoon, without, in the majority of cases, effecting any self cures. Koch's treatment seems only suited for mild cases in a very early stage, but even then the remedy in many instances is more fatal than the disease. Such cases are frequently cured with improved nutrition, but what I wish to see is a specific for acute tuberculosis; so with typhoid fever, we do not want a cure for mild cases, but a specific for the most severe types. If we cannot eradicate or destroy the typhoid bacilli, we want an agent to antagonise the poisonous leucomaines, which they generate, just as atropine antagonises the action of muscarine. Some good work in this direction has been done by Hankin, Behring, Kitasato, Roux, Yersin, and others.

In an interesting article on "Cures for Infectious Diseases" in the *British Medical Journal*, February 28th, 1891, Mr. Hankin says, "Our knowledge of the nature of the conflict between the organism and the microbe has now so far advanced that, of the numerous cures that have been attempted, a partial explanation of the *modus operandi* of the curative agents can in many cases be brought forward. Such "cures" can be roughly divided into two classes; (*a*) those in which a "febrile reaction" is probably produced, and (*b*) those in which a bactericidal substance is introduced into the living animal body." He then refers to Buchner's method of curing anthrax by injections of sterilised cultures of bacillus pneumonia; to Emmerich's inoculations with the erysipelas microbe; and to

his own cures of anthrax by injections of minute quantities of pepsin and trypsin. All these substances produce a "febrile reaction," and he has "found that when the animal's power of resisting the onset of the disease has been increased by injecting a "protective proteid," a febrile reaction occurs, and on the death of the animal the bacilli showed various signs of degeneration."

It has been assumed that the high temperature is inimical to the life of the bacilli, but Bouchard has shown that this explanation does not hold good, and Hankin has found that during the "febrile reaction," "protective proteids" are formed which antagonise the action of the bacilli, therefore, it would seem that what we want is the introduction of "protective proteids" from without, and thus obviate the necessity of the body generating its own antidote, and so save it from the evil effects consequent on the high temperature. Mr. Hankin refers to the work of Behring and Kitasato on tetanus and diphtheria. "These investigators have succeeded in curing the above mentioned diseases by the injections of serum from animals that had previously been made immune against the tetanus and diphtheria bacilli. In this case, however, the serum appears to owe its curative power to a substance that destroys the poison produced by the microbes rather than the microbes themselves." "Behring has made mice immune against anthrax by injection of rat's serum. Ogata and Jasuhwara have succeeded in curing mice from attenuated anthrax by injections of blood from dogs, rats, and frogs." Mr. Hankin has attained similar results from the injection of rat's serum. The defensive proteids, or alexins, present in the normal animal, he terms Sozins; and those present in the artificially immune animal, Phylaxins. From such experiments as these we may hope in the future to obtain great results in the treatment of all infectious diseases.

It has appeared to me that the chief incidence of typhoid fever under thirty years of age may be due to the greater alkalinity of the blood serum and intestinal secretions in early life. Over thirty years of age I have found it principally in

those who were in a depraved vital condition, or in those who had an insufficient supply of animal food. The acquired immunity against the disease I believe to be associated with the increased formation of acid in the system. In the treatment of the disease I am always anxious to render the alvine excretions acid. Rather opposed to these views is the known fact that the typhoid bacillus grows on slices of potato with an acid reaction. Recently, Professor Uffelmann has found that it will grow on nutrient gelatine rendered acid with citric and acetic acids, and that it bears a high degree of acidification. However, it is not entirely a question under what unfavourable circumstances the typhoid bacilli may grow, but they certainly seem to flourish most luxuriantly in the alkaline contents of the small intestines—where also there is no oxygen. I shall now give a brief review of the treatment of continued fever from the time of Sydenham, with more special reference to the antipyretic treatment.

A HISTORY OF THE TREATMENT OF THE CONTINUED FEVERS, FROM THE TIME OF SYDENHAM.

Sydenham was the genius of his age, and since his time there have been few such close observers of natural phenomena. Of him the poet Sewel wrote :—

> "Syd'nham, a great and mighty genius came,
> Who founded Medicine on the noblest frame :
> He study'd Nature thro', and Nature's laws,
> Nor blindly puzzled for the peccant cause.
> Father of physick He—Immortal Name !
> Who leaves the Grecian but a second fame.
> Sing forth, ye Muses, in sublimer strains,
> A new Hippocrates in Britain reigns :
> With ev'ry healing plant his grave adorn,
> Saviour of many millions yet unborn."

Sydenham's great success in practice largely depended on his close observance of natural laws. He aided and assisted the natural processes of cure, and did not thwart nature like many of his predecessors and successors. By nature he always meant "a certain assemblage of natural causes, which, tho' destitute of reason and contrivance are directed in the wisest manner, whilst they perform their operations, and produce their effects ; or, in other words, that supreme being, by whose power all things are created and preserved, disposes them all in such manner, by his infinite wisdom, that they proceed to their appointed functions with a certain regularity and order, performing nothing in vain, but only what is best and fittest for the whole frame of the universe, and their own peculiar nature ; and so are moved like machines, not by any skill of their own, but by that of the artist." In his opinion, "a disease, how prejudicial soever its causes may be to the body, is no more than a vigorous effort of nature to throw off the morbific matter and thus recover the patient."

In treating of the continued fever of the years 1661, 1662, 1663, and 1664, he only used blood-letting "in young persons of a strong and sanguine habit. After the bleeding he ordered an emetic in cases where there had been any retching, as he thought that by thus expelling the "humour," he obviated the occurence of diarrhœa towards the termination of the fever. He ordered the antimonial emetic to be followed by three quarts or a gallon of posset drink, "because this kind of emetic is dangerous unless plentifully diluted; and therefore as often as the patient vomited, or purged, he was directly to take a draught of the posset drink, by which means griping was prevented and the vomiting rendered more easy." "As soon as the operation was over, the severe symptoms, viz.:— the nausea, anxiety, restlessness, deep sighing, blackness of the tongue, &c., usually abated, and went off, so as to leave the remainder of the disease tolerable."

In the present day emetics are not employed frequently enough (a few tumblerfuls of hot water are usually sufficient without any medicinal substance), but those who have witnessed the beneficial effects which often follow such a mechanical procedure, are not likely to neglect its use. The bleeding and emetics were only used at the beginning of the fever, and both were omitted in the case of children under fourteen years of age. He prescribed a clyster occasionally during the progress of the fever, but towards the decline, "the more costive he is kept, the more secure I judge him; the febrile matter then proceeding more kindly and quietly to concoction." "Cordials, as I have experienced when given too soon, do mischief, and unless bleeding has preceded, may drive the crude matter of the distemper upon the membranes of the brain, the pleura, &c., and therefore I never give them when either no blood, or very little has been taken away; or when no other considerable evacuation has been made; or the patient has not passed the meridian of life." "The fever itself is no other than the instrument of nature, by means whereof she separates the vitiated parts of the blood from the sound; though she does this in a manner perfectly im-

perceptible at the beginning, and even at the state of the distemper, but more manifestly in the decline thereof, as appears from the sediment in the urine. The concoction of the febrile matter here means no more than a separation of the morbific particles from the sound, whence the way to hasten this concoction is not by moderating the fever, but the effervescence must be kept up so long as the safety of the patient will give leave; but when the disease is in the decline, and the separation becomes manifest, warmer medicines should be immediately given, in order to finish the operation with greater certainty and expedition."

We thus see that he did not believe in antipyresis, though much of his treatment had a cooling tendency. He gives several prescriptions for cordials, from which we cull the following ingredients, borage, citron, black cherries, barley cinnamon water, prepared pearl, sugar, strawberries, oriental and occidental begoar, a leaf of gold, syrup of the juice of citron and cloves. However, he does not seem to have prescribed without a definite object in view. "When the fermentation neither rises too high, nor sinks too low, I leave it in that state, without prescribing any medicines, unless forced to it by the importunity of the patient, or his friends; and then I direct such only as may please without prejudicing."

His treatment of the humbler classes was more simple, but I have no doubt not less effectual. "I should not omit, that frequently when I was called to persons of low circumstances, I ordered them to do nothing else, after bleeding, and vomiting when required, but to keep in bed during the whole course of the distemper, and to sip only water gruel, barley gruel and the like; to drink moderately of warm small beer to quench their thirst, and to take a clyster of milk and sugar every day, or every other day till the tenth or eleventh day of the distemper; but towards the end of the fever, when the separation has begun, and proceeded slowly, to promote it, I allowed them now and then a little stronger malt liquor, instead of cordials. And thus without anything further except a gentle purge at the end of the distemper, they generally did well."

In the treatment of the plague of 1665 and 1666, Nature seems to have failed him, and he resorted to rather profuse bleeding and sweating. He placed a high estimate on the use of blood-letting in this disease, "but tho' I greatly approve of this method, and have formerly experienced its usefulness in many instances; yet, for several reasons, I prefer the dissipation of the pestilential ferment by sweat to its evacuation by bleeding; because sweating does not weaken the patient so much, nor hazard the reputation of the physician."

The continued fever of the years 1667, 1668, and 1669, seemed largely to assume the characteristics of typhoid as we now see it; the disease was long drawn out, did not end by a crisis, the bowels were loose, and the petechiæ were few. In this disease we find him using cooling remedies, and recommending the patients to sit up a good part of each day so as to avoid being over-heated in bed.

The continued fever of the years 1673, 1674, and 1675, seems to have been a mixture of typhus and typhoid. He found that free blood-letting did not answer, he used large blisters between the shoulders to arouse the patients up from their stupor, insisted on them getting out of bed each day, and when too weak to sit up he directed that they should be dressed, and lie on the bed with the head well raised.

The following observations are as applicable to-day as when they were written. "Nor do I think it below me to acknowledge, with respect to the cure of fevers, that when no manifest indication pointed out to me what was to be done, I have consulted the safety of my patient, and my own reputation, most effectually, by doing nothing at all; for whilst I carefully attended to the disease, in order to cure it in the best and safest manner, the fever either went off gradually of itself, or came to such a state as showed that medicines were to be used to remove it. But it is much to be lamented that abundance of sick persons are so ignorant, as not to know that it is sometimes as much the part of a skilful physician to do nothing at all, as, at others, to exhibit the most effectual remedies; whence they not only deprive themselves of the advantages of a fair

and honourable procedure, but impute it either to negligence or ignorance, whereas the most illiterate empiric knows how to heap medicine on medicine as well as the most prudent physician, and usually does it in a much greater degree."

He gives a good account of the use of Peruvian bark, or Jesuit's powder, in the treatment of intermittents, and tells us that it was introduced into London about the year 1650. In an essay, on the rise of a new fever in 1685, we find him speaking of "a change of the constitution of the fever," which reminds us that our immediate predecessors spoke of "a change of type," to account for their change of practice. Sydenham, however, continued his practice of moderate blood-letting and purging. He laid it down as an axiom in the treatment of all fevers that emetics and purgatives should never be administered before the bleeding. The basis of his treatment consisted of bleeding and purging, while sweating took a subsidiary place. With Sydenham, everything was brought to the test of experience, and he seemed to hold in low esteem "those physicians who regulate their practice more by idle speculation than experience founded on the solid testimony of the senses."

I might give many more extracts from the writings of this truly great man, but these must suffice. His work for a long time remained the standard authority in Britain, and to a great extent regulated the practice on the Continent. The celebrated Boerhaave said of Thomas Sydenham that he was "the ornament of England, and the Apollo of the art, whom I never consider but my mind presents me with the genuine picture of an Hippocratic physician, and to whom physic is so much indebted, that all that I can say will fall far short of his merit."

Among those who trod the paths laid down by Sydenham may be mentioned—Hermann Boerhaave, Hoffman, Baglivi, Ramazzini, Heister, Van Sweiten, Mead, Huxham, Shaw, Nicholls, Hoadley, Cheyne, Hillary, Turner, Fuller, Arbuthnott, Wintringham, Clifton, Langrish, Barker, Swan, Stonehouse.

Hoffman used warm bathing in maniacal disorders; and in the treatment of the plague (which seems to have been a species of anthrax), he avoided blood-letting, and was very sparing in the use of remedies, observing "that few are best." He studiously watched natural processes, and he used the term Nature, as "a word to signify the structure, mechanism, and contrivance of the body, acting with certain powers, according to certain necessary and mechanical laws, assigned it by its maker."

Huxham described a low putrid fever which was epidemic at Plymouth in the autumn of 1729. "It remitted towards the end, and at length intermitted. It chiefly affected the head, stomach, and loins, as if the small-pox was coming on, and was attended with an oppression of the breast, sighing, and great faintness. It chiefly attacked children, women, young or weak persons. The blood taken away was seldom viscid; the urine mostly crude, thin, and frequently let fall a cineritious, slimy, and imperfect sediment, resembling flour, called by Hippocrates a branny sediment; the more perfect the sediment was, the more hopes there were of recovery. The tongue was not very dry, but appeared to be covered with a kind of viscous brownish mucus. Towards the declension of the distemper a looseness or sometimes a dysentry, especially if a vomit had been omitted in the beginning, became very immoderate, and even proved fatal to some." He found that "bleeding, unless in the beginning, seldom did service; vomits were highly necessary, and afterwards frequent blisters." He gave plenty of liquids, avoided strong purgatives, and administered bark towards the declension of the fever. He used ipecacuanha as an emetic, occasionally strengthened with two or three grains of tartar emetic.

Dr. Langrish, speaking of intermittent fevers, in his "Theory and Practice of Physic," says—"The cold bath, where age or no inward weakness forbid it, is exceedingly proper, especially in the summer season, to recover the lost tone of the fibres, and to grind and comminute the viscid ill-conditioned juices, and to prevent catching cold." There is one sentence which

might have emanated from a clergyman rather than a physician. Speaking of the virtues of nitre, he says—"It is highly esteemed, and constantly used in all distempers where the blood boils with fervent heat."

In 1753, Dr. Swan published his third edition of the works of Sydenham, whom he held in the highest reverence, and to whose precepts he closely yet intelligently adhered.

In 1752, Sir John Pringle recommended in malignant fevers, an abundant supply of fresh air. He bled and gave emetics in the early stages, afterwards used diaphoretics, especially spiritus mindereri, and laxatives. Towards the close of the disease, when there was great prostration, he gave bark and serpentary roots, and cordials. "But, for a grateful cordial in this state, there was nothing comparable to wine, whereof the common men had an allowance to half-a-pint a day, of a strong kind, made into whey or added to the panado, which was their only food. But to others out of the hospital, I commonly prescribed Rhenish or French wine, of which several have consumed a quart a day, and some part of that undiluted." He made some valuable experiments with septics and antiseptics; showed that alkalescence did not necessarily lead to putrescence, and was about the first to point out the antiseptic property of ammonia.

In 1757, 1762, and 1779, the first, second and third editions of Dr. Lind's admirable work on the "Health of Seamen, Fevers, and Infection," etc., appeared. It was he who discovered "the method of freshening sea-water by distillation," he laid down excellent rules for preventing and limiting the spread of infectious diseases, and ascribed great importance to a free supply of fresh air, not only in the treatment but also in the prevention of the disease.

The views of Cullen for a long time regulated the practice in Edinburgh, and owing to his world-wide reputation had a very extended influence. There were however some men, especially in the British Army and Navy, of independent thought and action, such as Drs. Lind and Robertson, who drew their inspirations from experience and not from the practice of any

Academic Institutions. The first edition of Cullen's work was published in 1772, and the second in 1777. All Cullen's writings were exceedingly systematic and his treatment of the continued fevers was no exception to the rule. Want of space prevents me entering into all the minutiæ of his treatment and it must, therefore, suffice to say that he freely employed such remedies as blood-letting, emetics, diaphoretics, and purgatives, while he kept the patients on a low diet, and was very sparing in the use of stimulants. About this time Cullen's great rival, Dr. John Brown, was rising into fame. He looked upon fevers as asthenic diseases which required stimulating treatment.

In 1783 there was published a remarkable work "On the Jail, Hospital, or Ship Fever," by Robert Robertson, M.D., of H.M. Navy, and dedicated to Dr. William Hunter. He prescribed bark very freely, (even when it was a guinea a pound), and almost completely discarded blood-letting :— "Scarcely one patient could bear the loss of a few ounces, without either becoming languid or faint, and complaining more afterwards of debility than other patients. Thus I was taught to withhold the lancet, and am now thoroughly convinced that it will not be necessary in one case among a hundred of ship fever, to let blood." His practice was attended by remarkable success; on board the Juno he had one death in 216 cases, whereas the death rate under other methods was about one in nineteen. On board the Edgar between July 1st, 1779, and August 1st, 1780, he had 475 fever patients with six deaths, whereas in the Gibraltar hospital between January 19th and April 20th, 1780, there were 570 fever patients with 57 deaths, under the antimonial and "camphire" treatment. His book affords very pleasant reading, compared with the blood-thirsty work of many of his predecessors and successors.

The use of cold water in fevers dates from a very early period in the history of medicine, but its more methodical application began about this time. It was claimed by Dr. Robert Jackson that he used it as early as the year 1774, and he mentioned it in his treatise on the "Fevers of Jamaica,"

published in 1791. Although his claim to priority was disputed by the *Edinburgh Review*, and by Dr. Currie who gave the credit of the discovery to Dr. Wright, it would appear to me that Dr. Jackson in his "Exposition of the practice of affusing cold water on the surface of the body as a remedy for the cure of Fever," published in 1808, very fairly established his claim. His works show him to have been a man of considerable resource, and an original thinker of no mean order; and although much might be said in favour of his method of warm bathing followed by cold affusion, yet his practice in other respects was so objectionable, especially his free use of the lancet, that the chief credit for the introduction of cold water bathing in fevers must be given to Dr. Currie.

Dr. Jackson, in his work "On the History and Cure of Febrile Diseases," published in 1817, strongly advocated and extended the use of cold water affusions. He thought that the precepts of Dr. Currie limited the remedy to a narrow sphere. He did not allow the temperature of the patient to regulate its use, and generally prepared his patients for the application of the affusion by the abstraction of several pounds of blood. He taught that "disease is an enemy in all its presentations, not to be repulsed from the citadel merely—it is to be attacked and totally destroyed in the out-work; and this I conclude will be the object with the provident and bold physician." There was more boldness than providence in his practice.

In 1777, Dr. Wright, formerly of the island of Jamaica, and afterwards President of the Royal College of Physicians, Edinburgh, treated himself and a Mr. Kirk for fever, while on a voyage from Jamaica to Liverpool, by affusions of cold salt water. He published an account of the two cases in 1786, but during the intervening nine years he does not seem to have repeated the experiment, and is therefore not entitled to very much credit, for as Dr. Jackson justly observed, "a medical discovery comprehends something more than a solitary experiment."

In 1787 this practice was adopted and very successfully carried out by Drs. Currie, Brandreth, and Gerard, of Liverpool, and it soon became the recognised treatment throughout

Lancashire. The method gradually spread throughout this country, with the exception perhaps of London, where it never seemed to have got a firm footing. Dr. Wright does not seem to have contributed anything to the literature of the subject beyond his first paper, but no doubt after his migration to Edinburgh, he influenced Dr. Gregory, the Professor of the Practice of Medicine, who enthusiastically took up this new treatment. The cold water cure, however, had secured in Dr. Currie a much abler apostle than either Drs. Wright or Gregory, and it was thus brought into a prominence which it could never have attained under its originators. When Dr. Gregory wanted some information on the subject regarding the treatment of the members of his own family who were suffering from scarlet fever, he was directed by Dr. Wright to apply to Dr. Currie. Dr. Gregory seems to have had an excellent method of impressing his students with his dogmatic teaching and ex-cathedrâ statements, but he belonged to a very sanguinary school, and it is perhaps just as well for the medical history of Edinburgh that only fragmentary evidence of his teaching is now extant. On the other hand Currie seems to have been a man considerably in advance of his time, and even at the end of the last century had to a great extent shaken himself free from the traditionary trammels of blood-letting.

To Dr. Currie belonged the great merit of laying down definite rules to govern the application of the affusion of cold water, and as these rules are almost as definite as those enunciated by our German colleagues in the present day I cannot forbear quoting them. Dr. Currie says:—"The safest and most advantageous time for using the aspersion or affusion of cold water, is when the exacerbation is at its height, or immediately after its declination has begun; and this has led me almost always to direct it to be employed from six to nine in the evening, but it may be safely used at any time of the day, *when there is no sense of chilliness present, when the heat of the surface is steadily above what is natural, and when there is no general or profuse perspiration.* These particulars are of the utmost importance."

" 1. If the affusion of cold water on the surface of the body be used during the cold stage of the paroxysm of fever, the respiration is nearly suspended; the pulse becomes fluttering, feeble, and of an incalculable frequency; the surface and extremities become doubly cold and shrivelled, and the patient seems to struggle with the pangs of instant dissolution. I have no doubt, from what I have observed, that in such circumstances, the repeated affusion of a few buckets of cold water would extinguish life. This remedy should therefore never be used when any considerable sense of chilliness is present, even though the thermometer applied to the trunk of the body, should indicate a degree of heat greater than usual."

" 2. Neither ought it to be used, when the heat, measured by the thermometer is less than, or even only equal to, the natural heat, though the patient should feel no degree of chilliness. This is sometimes the case towards the last stages of fever, when the powers of life are too weak to sustain so powerful a stimulus."

" 3. It is also necessary to abstain from the use of this remedy when the body is under profuse sensible perspiration, and this caution is more important in proportion to the continuance of this perspiration. In the commencement of sweating, especially if it has been brought on by violent exercise, the affusion of cold water on the naked body, or even immersion in the cold bath, may be hazarded with little risk, and sometimes may be resorted to with great benefit. After the sweating has continued some time and flowed freely, especially if the body has remained at rest, either the affusion or immersion is attended with danger, even though the heat of the body at the moment of using it be greater than natural. Sweating is always a cooling process in itself, but in bed it is often prolonged by artificial means, and the body is prevented cooling under it to the natural degree, by the load of heated clothes. When the heat has been thus artificially kept up, a practitioner, judging by the information of his thermometer only, may be led into error. In this situation, however, I have observed that the heat sinks rapidly on the exposure of the surface of the body

even to the external air, and that the application of cold water, either by affusion or immersion, is accompanied by loss of heat and a deficiency of reaction, which are altogether inconsistent with safety."

"Under these restrictions the cold affusion may be used at any period of fever; but its effects will be more salutary in proportion as it is used more early. When employed in the advanced stages of fever, where the heat is reduced and the debility great, some cordial should be given immediately after it, and the best is warm wine."

The temperature of the water used by Dr. Currie ranged from 40° to 70° Fahr., according to the season of the year. "The solution of the fever depends chiefly on the sudden, general, and powerful impression on the sensations, and this impression is less affected by the difference in the temperature from 40° to 65° as far as my observation extends, than might on a first consideration be imagined. Within these limits the efficacy of this remedy, as well perhaps as its safety, depends on the suddenness and momentariness of its application. The powerful impression on the sensations is much weakened when the water is poured slowly on the body, and as the respiration is suspended or convulsed during this application, as well as during the act of immersion in the cold bath, it might in some cases incur hazard to protract it."

The value of Dr. Currie's observations on fever is much enhanced by the fact that he regularly used the thermometer, and he seems to have been the first physician to record the thermometric observations throughout the whole duration of a case of small-pox. He strongly held views which pass current in the present day. "It was a position of the celebrated Boerhaave, that the morbid heat in fever, being a symptom only, might therefore be disregarded. But can we suppose that a heat, six or seven degrees greater than that of the blood in health, however generated, will not have the most important effects on the system, and if it stands in relation of effect to the preceding symptoms, that it will not operate as a cause on those which succeed?"

"It is a serious error to suppose that the febrile poison, if so we may call it, being received into the system, is the principal cause of the symptoms, and that they consist of a struggle of nature to expel it, without which health cannot be restored. It is safer to consider it as an agent that excites the system into fever, which however is carried on, not by the continued presence and agency of this agent, but by the principles which regulate the actions of life. We are not therefore to wait for the sanative process by which nature is supposed to separate this virus, and to throw it off, watching her motions and assisting her purposes; but to oppose the fever in every stage of its progress with all our skill, and to bring it to as speedy a termination as is in our power."

Dr. Currie explicitly stated, without any apparent doubt in his mind about the diagnosis, that he aborted many cases of typhus fever in the first, second, and third days of the disease by cold affusion. The evidence which he adduced in support of these cases being really typhus fever would scarcely be accepted in the present day, though it was accepted so late as 1867 by the late Dr. Hudson, of Dublin, but this eminent authority did not bring forward any cases of his own in support of such conclusions.

It is probable that many of his cases of aborted typhus were merely the effects of a drunken debauch. In epidemic times, alcohol is frequently looked upon as a preventive of fever, and for this and other reasons freely imbibed. Dr. Currie used very little alcohol in the treatment of fevers, though in many other diseases he ordered it with an unsparing hand.

The cold water treatment was very soon abused. In the second volume of his work, Dr. Currie tells us:—"It has come to my knowledge, that in two cases of scarlatina, of the most malignant nature, the patients have been taken out of bed, under the low delirium, with the skin cool and moist, and the pulse scarcely perceptible. In this state, supported by the attendants, several gallons of perfectly cold water were madly poured over them on the supposed authority of this work! I need scarcely add, that the effects were almost immediately fatal."

Dr. Currie himself exercised great caution over the use of cold water in fevers, but he had such faith in the remedy that he quickly extended its use to other diseases for which it was in no way suited, and his want of success often made him more bold in its application. In a case of tetanus, where he says, "our proceedings being obstructed neither by the prejudices of ignorance, nor the weakness of affection, another, and a last effort for his life was resolved on." This last effort is thus described:—"Gardner was carried to the public salt water baths of this town, then of the temperature of 36° Fah., and thrown headlong into it. The good effects were instantaneous. As he rose from the first plunge, and lay struggling on the surface of the water supported by two of his fellow soldiers, we observed that he stretched out his left leg, which had been for some time retracted to the ham. But his head did not recover the same freedom of motion, and therefore he was plunged down and raised to the surface successively for upwards of a minute longer, the muscles of the neck relaxing more and more after every plunge. When taken out, we felt some alarm; a general tremor was the only indication of life, the pulse and the respiration being nearly if not entirely suspended." However the after treatment was very successful, "and in less than a month we had the satisfaction of seeing our patient under arms, able for the service of his country." Several of his succeeding cases of tetanus were not followed by such happy results, and there seemed to to be a danger of cold water falling into disrepute in this disease, until he superadded wine and bark on the authority of Dr. Rush, of Philadelphia. In one successful case, during twenty-eight days, the patient "drank, mixed with nourishment, and by itself, the extraordinary quantity of a hundred and forty bottles of wine, being five bottles of Madeira a day, besides some ale, and several gallons of brandy." Teetotallers will be pleased to learn that afterwards this man took a decided aversion to strong liquors. Such cases as those show the necessity for a man not having too much faith in anything, not even in himself.

In 1783, Dr. Haygarth, of Chester, almost stamped out typhus in that city by a system of ventilation, isolation, and disinfection. His practice was afterwards adopted in most of the large towns of Great Britain and Ireland.

In 1816, Dr. John Armstrong, Physician to the Fever Institution of London, supported, in a modified form, the practice of Currie. He also tried to revive venesection, which had to a certain extent fallen into disuse, under the influence of the Brunonian doctrines. He condemned the use of stimulants in the first and second stages of typhus fever, but admitted them towards the close.

In 1816, Dr. Robert Thomas, of Salisbury, in his practice of physic, followed the teaching of Jackson rather than that of Currie with reference to cold ablutions, and as a pupil of Cullen and Gregory, he was an advocate of such evacuants as bleeding, purging, and vomiting.

In 1818, Dr. Thomas Bateman recommended sponging with cold water rather than affusion, and he was a strong advocate for bloodletting in opposition to the Brunonian doctrine of asthenia, with consequent stimulation. He also preferred the antiphlogistic theories of Cullen to the views on antiseptics of the chemical school.

At the beginning of the present century, Dr. Clutterbuck ascribed fevers to a topical inflammation of the brain, and reiterated his views in the second edition of his work published in 1825. He refused to admit any essential difference between idiopathic and symptomatic fevers; just as the pyrexia of the latter was due to inflammation of some organ, so that of the former was due to inflammation of the brain. This theory as to causation was naturally followed by an active antiphlogistic treatment. He was willing to admit the value of cold affusions in the early stages of typhus fever as a means of lessening the "inflammatory action in the vessels of the brain," but he ascribed its beneficial effects to the sudden impulse on the nervous system and not to an abstraction of heat from the body.

In 1822, Dr. Park reduced the causes of fever to three,

"sympathy, irritation, and debility," and his treatment was equally definite. "Thus bleeding, which is almost specific in inflammatory fever, is rarely called for, and generally inadmissible in ague. Cold affusion, which often cuts short an attack of tpyhus, would be dangerous, if not fatal, in fever from local inflammation. Bark, arsenic, and opium, if administered in the same manner as in ague, would be injurious in typhus, and wholly inadmissible in every form of fever with local inflammation."

In 1824, Dr. Mills looked upon typhus fever as essentially a phrenitis, and his views as to cause and treatment were very similar to those of Dr. Clutterbuck, though he wished to claim a certain amount of originality for himself.

In 1825, Dr. Mason Good in his standard work on medicine, gave a good account of the history of the cold water treatment and strongly advocated its use. He also prescribed quinine, and was very careful in the use of alcohol. "We must be cautious however, in first administering it; for its very stimulus produces exhaustion, and consequently increased torpitude; and we should invariably recollect, that when we have once commenced with its use, we can never leave it off; and should hence begin with such doses as may be safely persevered in, or even increased if necessary."

Dr. Cuming Askin has placed in my hands the unpublished lectures of his grandfather, Dr. Thomas Cuming, which were delivered in the Carmichael School of Medicine, Dublin, in 1826. Dr. Cuming in simple continued fever employed emetics in the early stage; the cold affusion as carried out by Currie in the second stage, together with active purgation; while in the stage of collapse he gave 4 to 12 ounces of Madeira wine daily, and was careful that the patient should not then have more than two motions daily. In the inflammatory types of the disease, and where there was evidenee of visceral congestions he employed general and local blood-letting. In cases of internal hæmorrhage he used opium freely.

In 1830 there appeared a treatise on fever by Dr. Southwood Smith, a very vigorous writer and an equally bold practitioner.

He scorned the views of adynamia which were then beginning to prevail, speaking of typhus fever, he says :—"The notion of debility in the intense forms of fever I look upon to be an error no less palpable in its nature than destructive in its consequences ; and if the havoc it produces do not confer upon it a pre-eminence as bad as that of the very disease of which it is supposed to constitute the essence, it at least entitles it, in comparison with every other error in medicine, to the distinction recognised in society, between the hero and the murderer ; the one destroys a single human being now and then ; but the other numbers its victims by thousands." "The only morbid condition of fever, of which we have any knowledge, and over which the medical art has any control is that of inflammation." He held that the various types of fever differ in nothing but in the degree of their intensity. Mild cases required very little treatment except confinement to bed, the abstraction of stimuli, a poor diet, and frequent calomel purgatives, but when the fever passes beyond the mildest form, "it is never for a moment to be neglected."

From many pages of vigorous writing and forced similes I will cull a few sentences which will help to show the mode of treatment to which Dr. Smith subjected his fever patients. "The physician, in the first stage of fever, armed with his lancet, is to his patient what the fireman with his engine, before the flames have had time to kindle, is to a building that has taken fire. At this early stage, the former can check inflammation with almost as much ease and certainty as the latter can prevent the flames from bursting out. On the contrary, the physician who is called to treat inflammation in the later stage of fever is in the position of the man who arrives with the apparatus for saving the home when its stories have been already consumed, and its roof has fallen in." "During this early period the physician is master over the disease ; if he allow it to pass away without obtaining the victory, the disease becomes master over the physician. From that moment his control over it is gone, never can he regain his lost advantage. Fever is a process that advances with a

step as steady as time, and like time it never retraces a step." "The abstraction of blood must be carried to the extent of subduing the inflammation; there is no other limit to the quantity to be taken but that which is adequate to subdue the inflammation. To attempt to measure the quantity by drachms or ounces is wholly vain; because, if the remedy be properly employed, the quantity will vary in every individual case. To take an ounce more than the subdual of the inflammation requires is injurious; to take an ounce less is still more pernicious; to take the quantity necessary to accomplish the object, and no more, is to use the lancet—that powerful instrument, so dangerous in rash hands, and no less dangerous in weak, with the discernment and decision of a master."

"The best purgatives consist of one or two grains of calomel, with six or eight of rhubarb, repeated every night or every other night, and followed the next morning by two drachms or half-an-ounce of castor oil, or by a common senna draught. Cold sponging, if the skin be hot; acidulated drink, if there be thirst; perfect quiet, a dark room, a silent nurse, affording prompt attendance, with a noiseless step, a cheerful countenance, and no words—this, together with three teacups full of thin arrowroot or gruel, in the twenty-four hours, given in divided portions, at intervals of about two or three hours, comprises all else that will be required or that will be useful, until the period of convalescence."

When there were severe cerebral symptoms he employed the "remedy known by the name of the cold dash." It consisted of pouring a column of cold water upon the head in a continued stream from a height of from six to ten feet. "Employed as a remedy, there is no degree of burning heat which the animal economy is capable of producing, no intensity of vascular action, and no violence of pain that can resist its continued application. Sooner or later, usually in from ten to twenty minutes, the heat, though most intense, disappears, the skin becomes cold, the face pallid, the features shrunk, while the pulse is reduced to a mere thread, and the pain of the head, however violent and intolerable, entirely ceases." His friend,

Dr. Dill, while suffering from a severe attack of typhus fever was subjected to this most rigorous treatment in its entirety, and yet he recovered.

The reader will not now be surprised at the following statistics of the London fever hospital. In 1825 there were 588 cases with 104 deaths; in 1826, 676 cases with 110 deaths; in 1827, 676 cases with 87 deaths; and in 1828, 597 cases with 81 deaths. Dr. Southwood Smith's views on the nature of fever were largely a compound of the inflammatory doctrines of Clutterbuck and Broussais, and his practice was correspondingly energetic.

In 1830 there appeared a work "On Clinical Illustrations of Fever," by another physician to the London Fever Hospital, Dr. Alexander Tweedie, who lived to afterwards moderate his antiphlogistic practice, though he did not lessen his opposition to Dr. Currie's cold affusion. He noted the pathological lesions which occur in typhoid fever, but a specific distinction between typhus and typhoid fever was not drawn for another ten years, "I have generally prognosticated ulceration of the bowels, when the fever has run on for a lengthened period, and has produced great emaciation, accompanied with peculiar, harsh, dry or shrivelled appearance of the skin, black sordes on the teeth, with sympathetic disturbance in the brain." The enteric lesions had been previously described by Andral, Louis, and Broussais, but typhoid fever seems to have been the prevailing disease in France, while typhus was most prevalent in this country.

About this time there was a reaction in the Scotch and Irish Schools against the grave errors of depletion, and the teachings of Alison, Christison, Graves, and Stokes were to support the vital powers and thus enable the patients to overcome the morbid tendencies of fever. With the ideas of support alcohol came more into vogue and the use of cold water gradually waned. Alcohol was looked upon as a valuable food, and such implicit faith was placed in it as a means of support that it was largely used in acute diseases to the exclusion of almost every form of nutriment except beef tea.

In 1839 we find Dr. Roupell, of St. Bartholomew's Hospital, still adhering to the tenets of the London School. He used blood-letting, though not to a great extent, emetics, purgatives, salines, antimony, and mercury. He, however, prescribed stimulants, especially in the late stages of the disease.

In 1840, Dr. A. P. Stewart clearly distinguished between typhus and typhoid fever. He was followed by Sir William Jenner, Dr. Murchieson, and Professor Gairdner, and owing to the labours of these eminent men the specific distinctions between these two diseases have been well established.

In 1843, Dr. George Gregory, writing on scarlet fever, thought that the affusion of cold water was only applicable in a very limited number of cases.

In 1848, Dr. Ormerod of St. Bartholomew's hospital, had completely discarded blood-letting and was using stimulants in a careful but tolerably free manner in continued fevers.

In 1852, there was published a valuable work "On the History, Diagnosis, and Treatment of the Fevers of the United States," by Elisha Bartlett. In the treatment of typhoid fever he gives a summary of the views of others rather than any express directions of his own.

Dr. Todd, in 1859, clearly stated a doctrine which is largely held in the present day, viz.: "that disease is cured by natural processes, to promote which, in their full vigour, vital power must be upheld. Remedies, whether in the shape of drugs, which exercise a special physiological influence on the system, or in whatever form, are useful only so far as they may excite, assist, or promote these natural curative processes."

"It is a doctrine supported by our best physicians and highest authorities, that you cannot cure a fever; that is that you cannot cut it short; you can guide it through its several stages, you can support the patients strength, uphold his vital powers, until the influence of the poison is worn out, and combat any accidental affections which may arise in the course of the treatment, such as diarrhœa, pneumonia, &c.; and by such careful management you may save the patient, by preventing him dying by exhaustion, and you may shorten his

convalescence considerably." Dr. Todd's great fallacy lay in his belief that alcohol is a great supporter of vital power, and unfortunately this is a fallacy which was very palatable both to patients and their medical attendants.

At a time when Dr. Todd and his followers—who I think were composed of the great bulk of the profession in England—by their process of over stimulation were having a death-rate of over 20 per cent. in fevers, Professor Gairdner of Glasgow, by the use of milk rather than wine, and by the rational method of treating the patients rather than their diseases, had reduced the mortality to 10 per cent. It is not the first time I have expressed the opinion that Professor Gairdner has done more than any other man to reduce the death-rate in fevers, and he merits the greater credit as he has been a pioneer in effecting the great improvement which has taken place in the treatment during the past quarter of a century. The principles enunciated by Professor Gairdner have been gradually adopted in the practice of this country, and nowadays I think there is not much abuse in the use of alcohol, or in a too active medication, in fevers. How long this great improvement, which has to some extent been effected by a process of masterly inactivity, may be allowed to continue it is impossible to say. There have recently been signs of unrest, and a tendency to actively combat the fever with powerful antipyretic drugs, some of which are about as lethal as the fever poison.

In 1862, Dr. Tweedie spoke unfavourably of the cold affusion, and stated that, "it should, moreover, be kept in view that it is applicable only to the more acute forms of fever in vigorous subjects; for, in the more delicate, the shock may be too great and death may result from the practice—an event which occurred many years ago in the family of a late eminent professor, and greatly tended to throw the practice into discredit, and ultimately led to its final abandonment." One might have expected that it would probably have thrown the professor, rather than the treatment, into discredit, for possibly not following out the strict rules laid down by Currie. This reasoning, at any rate, attributes great importance to the life;

or death, of the professor's child, and is on a par with the supposed effect that the death of a bishop would have in stopping railway accidents. Possibly in these degenerate days bishops' and professors' children may have fallen from their high estate, but in the present day I don't think that the abuse of a remedy in any particular instance would have much effect on its stability. I am afraid it was not the death of the professor's child, but many such deaths which effected its discontinuance. Dr. Tweedie does not seem to have had much faith in quinine, the use of which, in the continued fevers, had been recently (1851) revived by Dr. Dundas, of Liverpool.

At this time the cold water treatment had almost fallen into complete disuse, but in 1861 it received a fresh impetus from a work on the "Hydrotherapy of Typhoid Fever," by E. Brand, of Stettin. The treatment was afterwards *warmly* espoused, though the remedy was *cold*, by Bartels, Jürgensen, Liebermeister, and Von Ziemssen, and it has now become the recognised practice in Germany.

In "Ziemssen's Cyclopædia," Liebermeister says:—"Quinine digitalis, and the abstraction of heat by cold baths are among the most important antipyretic agencies, and are positively indispensable to the effective treatment of the fever." . . . "The true danger consists in the *deleterious influence of high temperature on the tissues* by means of which necrobiosis of the same is brought about, manifesting itself anatomically as parenchymatous degeneration. Paralysis of the heart is the first in order among the conditions to be feared; second in order is paralysis of the brain; and third in the category come disturbances in other organs." From his standpoint, therefore, the fever has to be combated at all hazards. "For adult patients, the full length cold bath, of 68° Fah., or lower is to be preferred." . . . "The duration of the bath should be about ten minutes. If prolonged much beyond that it becomes unpleasant to the patient, and may even prove a danger to him. If feeble persons are much affected by the bath, remaining cold and collapsed for a long time, the duration should be

reduced to seven or even to five minutes. A short cold bath like this will have a much better effect than a longer one of lukewarm water. Immediately after the bath the patient should have rest; he is, therefore, to be wrapped up in a dry sheet and put to bed (which may, with advantage, be warmed, especially at the foot), lightly covered, and given a glass of wine. In dealing with very feeble patients, one may begin with baths of a higher temperature, say 75°, although, of course, these will produce less effect. A method especially to be recommended in such cases, if the surroundings permit, is that recommended by Ziemssen, of baths gradually cooled down, beginning with about 95°, and adding cold water gradually until the temperature is reduced to 72°, or below. These baths should be of longer duration."

He describes his usual plan of treatment as follows:—"If the patient is admitted before the ninth day of the disease he is first given calomel usually two to four doses, of eight grains each, in the course of a few hours, to which, very often, one or two doses are added the next day. From the time of his admission, his temperature is taken every two or three hours by day, and in somewhat severe cases, by night, too; and whenever the temperature in the axilla reaches or exceeds 102°, or that in the rectum 103°, a bath of 68° in temperature and of ten minutes in duration is given. Patients who require six or more baths during twenty-four hours, generally receive on the second evening 22 to 37 grains of quinine, the measurements of temperature, and the baths, as often as required, being still continued. If towards morning the temperature falls to 100·5° in the rectum, and if this remission is such that no baths are needed for twelve hours or longer, then forty-eight hours after the first dose a second one of the same size, or perhaps a smaller one is given; if, however, the fall of temperature was not sufficient, then the second dose is made larger, reaching 45 grains. If this prove sufficient, then the same dose or a smaller one is repeated every second night as long as the continuance of the fever seems to demand it. In the very severe cases, in which even 45 grains of quinine seem

insufficient, recourse is had to digitalis as soon as the morning after the administration of quinine. During the course of the next thirty-six hours, from 11 to 22 grains of powdered digitalis is used gradually, due regard being had to the state of the pulse and temperature. Immediately thereupon, that is, forty-eight hours after the last dose of quinine, 37 to 45 grains of the latter are given again. By the following morning the temperature has almost always fallen to 100·5°; sometimes to 98·5°, or even below, and frequently the virulence of the fever is broken for the rest of the attack, at least in so far as that it can be controlled by a continuation of baths and the use of quinine every other day. Under some circumstances it may be well to repeat the digitalis and quinine. If it should happen, as it very rarely does, that no sufficient remission is secured by the use of digitalis and quinine, we may still have recourse to veratria, which sometimes succeeds in sufficiently controlling the subsequent course of the fever."

This energetic treatment has found little favour in this country, and I think very few of those physicians who have adopted it have carried it out in its entirety. Even in Germany "the majority of patients find the cold baths decidedly disagreeable, no little persuasion and some authority on the part of the physician being required to induce them to submit thereto as often as is necessary." But it seems that towards the end of the treatment they "have often begged for permission to take a cold bath." The cold baths cannot be a very decided success, or else they would not require such powerful accessories as those enormous doses of quinine and digitalis and even veratria. Anyone in possession of his rational faculties who took 45 grains of quinine I should think would not desire to repeat the dose very soon, and if a patient of mine took 22 grains of digitalis in 36 hours I would trust that the drug was not very pure, or that the absorption from the patient's intestinal tract might be defective.

This treatment seems however to be undoubtedly attended with very great success in Germany, and Liebermeister shows that the death rate has been reduced from 27 per cent. under

what he calls "indifferent treatment," and which as Professor Gairdner has justly said must have been "very indifferent" to 8 per cent. under this complete antipyretic system. Recent statistics would seem to show an even lower death rate, but I will avoid quoting these as they are not accompanied with sufficient evidence, as to the severity of the epidemics, and we all know that typhoid fever is a disease which varies much in intensity. In this country we have had no such death rate as that recorded in Germany under "indifferent treatment," since the days of Dr. Todd and the alcoholic school, and therefore we have not had such headway to make up, which possibly may to some extent account for our less heroic treatment. Possibly also our less phlegmatic temperament may not be so well suited for this German treatment.

In 1878, Professor Gairdner published in the *Glasgow Medical Journal* a paper entitled "Caution in respect of the so-called Antipyretic Treatment in Specific Fevers," in which he showed equally good results by milder methods. Dr. Gairdner described this antipyretic method as "a battledore and shuttlecock treatment. It consists in keeping the patient, partly by means of cold baths, and partly by those other remedies, in a state of constant oscillation between fever and incipient collapse."

Among those in this country who have adopted the cold water treatment may be specially mentioned Dr. Cayley, Physician to the London Fever Hospital, who in the Croonian Lectures, 1880, warmly advocated cold bathing. "In estimating the value of any particular mode of treatment, we base our judgment on two classes of facts. First, by the observation of individual cases we see whether it appears to relieve the symptoms and exercise a favourable influence on the course of the disease. Secondly, we apply the test of statistics, and by collecting a great number of instances, we ascertain the effect on the general rate of mortality." He carefully points out the fallacies to which both these methods are liable, and shows that "before we are in a position to estimate the value of any particular mode of treating typhoid fever, we must be acquainted not only with the natural course of the disease, but also

with the usual rate of mortality." The first method is necessarily primary, and to my mind the most important, because if the advantages of any treatment were not apparent to my observation I would not carry it out for the sake of accumulating statistics, but if any treatment really exercise a favourable influence on the course of the disease in individual cases, its value will be proved by the second method. After judicially weighing the evidence I think he has clearly established his points that the antipyretic method, especially cold bathing, exercises a favourable influence on the course of the disease, and diminishes the general rate of mortality. I am quite willing, nay anxious, to concede all this, but I hope to show further on that as judged by both these tests there is a still better method.

To attempt to enumerate the writers on typhoid fever during the last half century would be a herculean task, but among those who have contributed to the general improvement in the treatment of the disease, and who have led rather than followed current thought may be mentioned—Alison, Bartels, Brand, Broadbent, Bouchard, Brouardel, Chomel, Cantani, Cayley, Collie, Christison, Nathan S. Davis, Dujardin-Beaumetz, Dumontpallier, Austin Flint, Fenwick, Féréol, Fuerbringer, Gairdner, Glénard, Grancher, Graves, Griesenger, Grimshaw, Huchard, Immermann, Sir William Jenner, Jürgensen, Jacoud, Libermann, Liebermeister, Leyden, Murchison, Nothnagel, Neubauer, Ord, Peter, Raynaud, F. T. Roberts, Rossbach, Rilliet and Barthez, Stokes, Arthur E. Sansom, Troussau, Traube, Vulpian, Wunderlich, and Von Ziemssen.

I must not omit to refer to an admirable address on the treatment of Typhoid Fever, in *The Lancet*, November 15th, 1879, by Sir William Jenner, the Sydenham of our own day. His treatment is largely symptomatic, as may be inferred from the following paragraph:—"I have never known a case of typhoid fever cut short by any remedial agent—that is cured. The poison which produces any one of the acute specific diseases (to which order typhoid fever as much as small-pox belongs) having entered the system, all the stages of the

disease must, so far as we know, be passed through before the recipient of the poison can be well. If the patient can be kept alive for a definite time the specific disease ends, and then, if no local lesion remain to constitute a substantive disease, the patient is well. The treatment of typhoid fever is essentially rational. To treat a case with the best possible prospect of success the physician ought to be acquainted with the epidemic constitution of the period, the etiology of the disease, its mode of attack, its natural course, the order of appearance, and the natural duration of each of its symptoms, the way in which each symptom influences the termination, the several pathological lesions which produce or may produce each special symptom, and the complications to be watched for at each stage of the disease."

With the numerous peptonising agents at present in the market, his condemnation of the free use of milk is not so applicable as when his address was delivered; and I should not care to endorse the amount of alcohol which he found it necessary to administer.

In this city, the original home of "the cold water cure," this treatment has not found much favour. Dr. Robertson carried it out in some cases, but he has now discontinued it. In cases of hyperpyrexia from rheumatic fever, the cold baths have been very successfully used by Dr. Waters, Dr. Carter, Mr. Paul, Mr. Damer Harrisson, and others. Personally I never approved of the cold water treatment of typhoid fever, because mild cases did not require it, and in severe cases the patients did not seem to me in a fit condition to bear such a series of intermittent shocks, which too frequently have to be counteracted by a liberal allowance of alcohol. Even for hyperpyrexia, I preferred to wrap the patient up in a sheet, and suspend him on another sheet over an empty bath, or lay him on a sofa which had been covered with waterproof sheeting, and then pour a stream of tepid water over his body until the temperature in his rectum was reduced to 101° Fah. By this means all shock is avoided, there is no inordinate chilling of the surface, the primary increase of the internal temperature does

not take place, there is no production of internal congestion, and the subsequent reaction occurs more slowly. When the temperature was thus reduced I would now place the patient in the continuous bath, and thus prevent any recurrence of the hyperpyrexia.

Those who have adopted the cold baths have not unfrequently found that in some cases they fail to make much impression on the temperature; this has been especially marked in large stout individuals who are covered with a non-conducting layer of fat, and in whom the cooling surface of the skin is comparatively much less proportionate to the mass to be cooled, than it is in lean individuals. A slight knowledge of the physics of water might have taught this without a number of useless experiments on human beings. Water is a very bad conductor of heat, and in fact its conducting power depends chiefly on its varying densities at different temperatures. This difference of density is so slight within the limited number of degrees that the water can be applied below the temperature of the body that the heat abstraction must take place comparatively slowly. When cold water is applied to the skin, it diminishes the circulation in the dermis, and thus lessens the supply of heat for abstraction, and increases its retention in the internal organs. For the foregoing reasons this is most marked in large fat bodies. Tepid water—which does not lessen the circulation in the skin—especially when it is brought into rapid contact with the surface either by affusion or by agitation of the water in a bath, abstracts the heat more quickly and effectively than can be accomplished by cold baths.

In 1861, Hebra introduced the continuous bath for burns and scalds, psoriasis, pemphigus, &c., and one of his patients was immersed for a hundred days, during which time he gained 14 lb. in weight. It has since been used by many surgeons on the Continent and in this country, but from the very limited number of references to this treatment in *The Medical Digest*, I conclude that it has not been frequently adopted. Perhaps the continuous partial bath has been more frequently used. Sir William Stokes, of Dublin, invented an excellent bath for

keeping a limb constantly immersed in water of a given temperature. Mr. Rushton Parker, of this city, used a partial boracic bath in several cases of operation for extroversion of the bladder. Nearly 20 years ago, my colleague, Mr. Puzey, successfully treated a case of pyæmia for nearly four months in a continuous bath. In 1886 when I was physician to the Stanley Hospital, I kept a patient who was suffering from pyæmia, acute periostitis of left femur, acute arthritis of left hip and knee joints, and extensive bed sores, for 17 weeks in a continuous bath. Not only was the life of this patient saved but she made a good recovery. This case was published in *The Liverpool Medico-Chirurgical Journal*, July, 1887. I then dealt fully with the physics of the subject, to which I need not now refer. Since then I have carried out this treatment in many cases of acute diseases, but as in these cases the bath only formed one, and perhaps not the most important factor in the treatment, I will not refer further to them at present.

The continuous bath has been used by Liebermeister and others for the treatment of bed sores following typhoid fever, but so far as I am aware it has not hitherto been used by any one for the fever itself. I find that a good many of those who have used the tank, have interposed waterproof sheeting between the patient and the water. This really converts the tank into the original water bed of the late Dr. Neil Arnott, and is quite distinct from the immersion treatment. The water bed should never be used as an antithermic agent, as water is an almost absolute non-conducter in a downward direction, as anyone should know who has ever boiled the superficial layer of urine in a test tube, and only conducts in an upward direction on account of its fluidity—the warm layer in contact with the heated surface becoming lighter rises to the top, and is replaced by a colder and denser layer, and so on until an equality of temperature is established. The result, when the febrile patient comes in contact with this cold surface, is, that a superficial film of the water may get slightly warmed, but very little heat is abstracted from the body ; on the other hand the cold bed chills the surface of the patient in contact

with it, contracts the bloodvessels, drives the blood to the internal organs, and raises the internal temperature, thus augmenting the evil it was intended to remedy.

The antipyretic action of even the ordinary immersion bath is frequently not well understood even by teachers of the art of medicine. One man immerses his patient in very cold water, another more cautious, but not less ignorant, places him in tepid water, and slowly and cautiously lowers the temperature. Both will tell you that you should be careful to employ the bath before the temperature of the patient reaches 105° Fah., as the internal temperature rises a degree or more after immersion. These crude experiments are performed on patients often with disastrous results, simply from the want of elementary knowledge of physics. If it were simply understood that water is a bad conductor of heat, and that consequently it should be constantly agitated so as to keep changing that in contact with the surface of the body, it would be found that there is no necessity for lowering the temperature to such a degree as to run the risk of producing collapse, and the necessity for warm cordials.

For four years I have been using the continuous bath as an antipyretic agent. From my observations in other cases I was led to conceive that it would have a good effect in typhoid fever, and in the cases which I have thus treated, my favourable anticipations have been more than realised. I do not look upon the high temperature as the sole evil of fevers, and therefore I have made no attempt to do more than moderate the temperature. I have been more anxious to keep the patient comfortable than to produce apyrexia. When the patient's temperature is high I prefer to keep the temperature of the tank water at 90° Fah., and as the temperature of the patient approaches the normal I raise the temperature of the tank to 95°. There is then no fear of producing a collapse temperature as the heat of the patient cannot fall below that of the tank. I hope also to show that the lowering of temperature is not the only advantage to be gained by a prolonged immersion.

It has been said with some degree of truth, though the analogy is not strictly accurate, that, "you can no more cure a fever than you can quell a storm; but you can guide a case, as you would guide the vessel, through the danger." A skilful mariner will direct his vessel safely amid reefs and shoals provided they are marked on his chart, or he can sail into placid waters until the storm blows past, so the careful physician should be on the look out for all danger signals ahead, or he can place his patient in the warm water of the tank, which has not merely the effect of allowing the fever to subside but also of quelling the violence of the storm and thus curing the fever. A clergyman referred to one of my patients "as the man in the dock," to which I replied that at at any rate we did not require a dry dock for effecting repairs.

DIAGNOSIS.

For the effectual treatment of any disease it is important to recognise not merely the state of the patient, but also the morbid conditions which underlie and give rise to that state. I may therefore be allowed to interpolate a few remarks on the subject of diagnosis. Too frequently when the case comes under the care of the physician the stages of doubt and difficulty have passed and the disease is only too apparent. The ideas of aborting specific diseases have in the present day been considerably altered, but there can be no doubt that such diseases may be considerably modified by early treatment, and often prevented from ever assuming a grave character. The commencement of typhoid fever is usually very insidious, and it is frequently only by a process of exclusion that we can arrive at a presumptive diagnosis, which, however, is generally soon clearly established by the characteristic increments in the daily temperatures, with marked evening exacerbations and morning remissions during the first four days; by the dull listless aspect of the patient; the tongue furred in the centre with red tip and edges; the abdomen swollen; the spleen enlarged; the motions at first dark brown and acid, afterwards becoming greenish yellow flocculent "pea soup" character and alkaline in reaction; and by, in the majority of cases, the appearance of the characteristic red lenticular spots on the abdomen and chest. Other diseases are perhaps more frequently mistaken for typhoid fever than the reverse, and many acute affections may complicate, or be complicated by typhoid fever, in which cases the diagnosis becomes correspondingly difficult.

Ehrlich has given us a valuable urine test in cases of typhoid fever, and on this subject there is an interesting article in *The Therapeutic Gazette*, February, 1891, to which I am under some obligation for the following remarks. Ehrlich made use

of the fact that sulphanilic acid, when treated with nitrous acid in a nascent state forms in solution the diazo-benzene-sulphonic acid, which thus becomes the active principle in the mixture employed. When this compound is brought into contact with some aromatic substance which occurs in the urine of cases of typhoid fever, but of the nature of which we are at present ignorant, a beautiful red colour reaction takes place when the excess of acid is neutralized by strong ammonia. In the preparation of this test two solutions are employed and kept in separate bottles, the one containing a five per cent. solution of hydrochloric acid saturated with sulphanilic acid, and the other a five per cent. solution of sodium nitrite in distilled water. One part of the sodium nitrite solution is added to twenty-five parts of the sulphanilic acid solution, and the whole mixed with an equal bulk of urine and rendered alkaline by a strong solution of ammonia. I have usually found the colour reaction best developed by adding five or six parts of urine to one part of the mixed solutions, and afterwards neutralizing with strong solution of ammonia. When the whole of the contents of the test tube are well agitated, the froth should have a pinkish tinge. The characteristic colour reaction varies from an eosin to a deep garnet, or deep ruby red, or port wine colour.

Dr. Charles E. Simon, in his paper published in *The John Hopkins' Hospital Bulletin* for November, 1890, only recommends a half per cent. solution of sodium nitrite, and of this solution he only uses one part to forty of the sulphanilic acid solution. This mixture seems to me much too weak in nitrous acid, and, moreover, nitrite of sodium is such an unstable salt which undergoes rapid decomposition, that I am afraid unless the solution was freshly prepared each time it was required, the test would frequently fail from the absence of any nitrous acid. Dr. Simon recommends the following modifications of the test:—He adds five parts of absolute alcohol to one part of urine, filters, and then runs into the filtrate the mixture of sulphanilic acid and nitrite from a burette, and by this means the amount necessary to develop the colour can be regulated.

The following method is said to be the most convenient, least expensive, and most delicate. "A few cubic centimetres of urine are taken in a small test tube, and an equal quantity of the sulphanilic acid mixture added, the whole being thoroughly agitated; one cubic centimetre of ammonia is then allowed to carefully run down the side of the tube, forming a colourless zone above the yellow urine, containing the acid; at the junction of the two a more or less deeply coloured ring will be seen, the colour of which is readily distinguished and noted, the slightest carmine tint being made out more readily by its contrast with the colourless zone above, and the yellow below, than when we are dealing with a uniform colour."

This colour reaction is almost invariably found during the first two weeks of typhoid fever. It has also been found in some cases of measles, phthisis pulmonalis, rheumatism, gout, and some other diseases, but when it has occurred in these affections it does not seem to have been so well marked as it is in typhoid fever. I have only been using this test for about eighteen months, and, therefore, cannot speak definitely as to its value, but although it is not pathognomonic, I believe, as a corroborative test, it will be found of considerable importance.

Drs. Hughlings-Jackson and Angel Money believe that in typhoid fever the knee-jerk is never absent, whereas in tubercular meningitis, its disappearance for a few hours, or a day, or a few days, is by no means rare. In some undoubted cases of typhoid fever there have been times when I have failed to elicit the knee-jerk, and it should be remembered that sometimes meningitis complicates this disease. In a paper which I published in *The Liverpool Medico-Chirurgical Journal*, January, 1891, on "The Treatment of Meningitis," I stated that—"I have seen the knee-jerks exaggerated, and even ankle clonus present in undoubted cases of meningitis, whereas it is only in severe cases of typhoid that these conditions appertain. If such observations be carried out for a more or less lengthened period of time, it will be found that the knee-jerks are much more variable in meningitis than in typhoid fever.

In the latter disease the knee-jerks are much exaggerated in severe cases, and this increases with the progress of the disease, and is often accompanied by marked ankle clonus. In meningitis, on the other hand, the knee-jerks and all the reflexes are apt to be increased during the hyperæsthetic stage, but when any cerebral effusion takes place the knee-jerks are apt to be abolished, at least temporarily. As a diagnostic sign, I attach far more importance to the hyperæsthetic condition itself, which, I may say, is invariably present in the early stages of meningitis, whereas in typhoid fever, although there is no abolition of reflex irritability, the patient is apathetic, and does not present any inordinate sensitiveness."

Neither will the tache cérébrale serve as a distinctive sign seeing that it is often more marked in typhoid fever than in meningitis. In meningitis—whether tubercular or simple—the temperature is usually not so high as in typhoid fever, the pulse is more variable in frequency, smaller, firmer, less compressible, and often rather irregular in rhythm if not in force; the headache and vomiting are more persistent, the bowels are usually confined, and the abdominal walls retracted; there is frequently paresis of some of the ocular or other cranial nerves, and not seldom double optic neuritis.

Acute pneumonic phthisis sometimes resembles typhoid fever, but the respirations and pulse are much more frequent unless the latter disease be complicated with pneumonia, and of course the discovery of the tubercle bacillus, would settle the point in favour of the former disease.

The onset of typhoid may in some cases be sudden, as in case 7 of my series, where the temperature reached 104° on the first evening, and in such a case if there be any harshness of breathing pneumonia might reasonably be suspected. It should also be recollected that in some cases of pneumonia the physical signs do not rapidly develop, but even then the respirations are usually quick and shallow. In typhoid fever there is very frequently bronchial catarrh, or hypostatic congestion of the lungs, or both, but these conditions, more especially the latter,

occur at a more or less advanced period of the disease, and, unless accompanied by some acute inflammatory mischief, do not give rise to any distress of breathing. Typhoid fever may complicate many acute diseases or be thus complicated, and when the patient first comes under observation at a late stage of the disease it may be difficult to diagnose the underlying typhoid condition from the pneumonia or other acute affection which has supervened. However a little time and patience will usually clear up all doubts, and I shall not dwell further on the subject.

THE TREATMENT OF TYPHOID FEVER.

I am now in a fair position for describing my own method of treatment. I may at once premise that typhoid fever is a disease which varies very much in severity, and therefore I do not believe in any routine system of treatment as applicable to all cases alike. If our object be to obviate the tendency to death, we will find that all or nearly all mild cases do well, and therefore require very little active interference. Of course the severity of the case must not be under estimated, as I am afraid too frequently happens, seeing we often hear of mild cases ending fatally. On reading the history of various epidemics of typhoid fever anyone must be struck with the great difference in the intensity of the disease as it affects various communities, and therefore similar methods of treatment are often attended with very different results, and frequently new methods of treatment get credit for results to which they are in no way entitled.

Appended to this essay I have recorded fifty-five successive cases, with only one death, so that any one can judge of their severity. Thirty-three of the cases were severe or very severe, while twenty-two may be reckoned mild as they did not require any special treatment, and never gave rise to any anxiety as to the ultimate result. The special treatment of the thirty-three cases has fulfilled the conditions laid down by Dr. Cayley, as it not only had a decidedly and very obviously beneficial effect on the course of the disease in individual cases, but it has greatly lessened the general mortality, and I have no doubt whatever but that if it were generally adopted thousands of lives would be annually saved.

Dr. Cayley, Dr. Broadbent, and Dr. Frederick Roberts estimate the mortality in this country from typhoid fever under the present expectant treatment at from 15 to 25 per cent., and I am afraid their estimate is only too true. Dr. Hope has

furnished me with the report of 677 cases treated in the fever hospitals of this city with a mortality of 82, or 12·1 per cent., of the cases treated. Dr. Hope feels justly proud of the comparatively low mortality in the Liverpool hospitals, but to my mind all these death-rates are much too high for any disease, the incidence of which for the greater part occurs under thirty years of age. Dr. Hope has arranged the cases of the Liverpool Fever Hospitals according to the ages of the patients. There were 303 cases under 15 years of age, with 22 deaths, or a percentage death-rate of 7·26. From 15 to 30 years of age there were 209 cases with 30 deaths, or 14·35 per cent. At 30 years of age and upwards there were 79 cases with 18 deaths, or 22·8 per cent. There were 86 cases in which the age was not specified, and these gave 12 deaths, or 14 per cent.

Prophylaxis. Prevention is better than cure and when we have got to deal with a case of typhoid fever we should, if possible, find out the source of infection so that the patient may not be further subjected to any deleterious influence, and that others may not be exposed to the risk from which the patient has failed to escape. Every possible precaution should also be taken to prevent the patient from becoming, either directly or indirectly, a cause of disease in others. In the filth and overcrowding of former ages arose the fearful epidemics of typhus fever which devastated this country, and then typhoid fever though not unknown was comparatively rare. In the present day we are able to quickly stamp out this infectious pest, but with all our modern conveniences of water-closets, baths, wash basins, &c., there is too often defective plumbing and bad sewerage so that the typhoid poison is directly introduced to our homes. We are not likely, however, to give over these conveniences on account of any attendant danger, it therefore behoves everyone to look to his own house, and to see that it is in good sanitary condition. Special attention should also be directed to the water and milk supply, and the various articles of food should not be neglected, for, as has been pointed out by Dr. Cayley, several epidemics have arisen from the consumption of diseased meat.

To prevent any spread of disease from the patient, all the dejections, and soiled clothing should be thoroughly disinfected. It would be rather hazardous to express a definite opinion as to which are the best disinfectants, especially where economy is a matter of some consideration, but for my own part I use for the fæces a saturated solution of sulphate of iron with two ounces of strong sulphuric acid to the quart; and the soiled linen, &c., are soaked for two days in a solution of the perchloride of mercury (1 in 1000), before being washed. After the recovery, or death of the patient, all the bedding and wearing apparel are disinfected by heat.

Dr. Cayley says that "the experience of the London Fever Hospital pretty conclusively proves that the fresh stools are innocuous." I might perhaps speak in a similar strain because under my care the disease has never spread to any nurse or other patient, but it seems to me a dangerous doctrine to inculcate. It is true that one of my cases arose in hospital, but I clearly satisfied myself that he must have contracted the disease before his admission. On the other hand Dr. Hope is convinced that the disease is more readily communicable from one to another than is generally supposed. I have had in succession four members of one family, and Dr. Hope tells me that he found the house in good sanitary condition, and although he was unable to trace the original source of the disease, he is strongly of opinion that the last three contracted it from the first affected. Dr. Hope quotes many similar instances in his paper, on "The Incidence of Typhoid Fever," in *The Liverpool Medico-Chirurgical Journal*, July, 1889.

If the poison be particulate, as it is almost universally assumed to be, and if it be reproduced in the system, and discharged in the fæces, then we should be very careful to explain what we mean by the "fresh stools being innocuous." It is highly probable that no harm can arise from the mere smell of a fresh stool, and that the typhoid bacilli cannot be thus communicated, but if, through carelessness on the part of the nurse, a little of this fresh stool got introduced into the food of others I should have grave apprehensions as to the

consequences. An anaerobic germ like the typhoid bacillus is not likely to assume any more virulent properties in the open air, yet it is generally acknowledged that soiled linen and dry pulverized excreta, may become sources of contagion. Such conditions, as heat, stagnation, exclusion from air, concentration of the poison, which are supposed to increase the virulence of the germs are surely found not unfrequently in the intestinal canal, and we often get recrudescences and relapses; it seems therefore to my mind very improbable that the fresh stools are innocuous.

Acting on my conviction of the contagious nature of the intestinal discharges from typhoid patients, I instruct the nurses that the stools are to be well mixed with an abundant supply of the disinfectant fluid and allowed to stand for a short time before they are poured down the water closet, and all utensils are to be washed with hot water and a disinfectant fluid. There are kept in each ward a ewer full of a solution of perchloride of mercury (1 in 2000), carbolic soap, a nail brush, and towels; and the nurses are directed to wash their hands well after every time they are in attendance on a typhoid patient, and more especially before they handle any article of food. I impress upon them the necessity for not allowing "familiarity to breed contempt," and give them clearly to understand that I shall be exceedingly displeased if any case of disease should arise either among the staff or other patients.

The room or ward should be large, airy, well ventilated, and kept at a temperature of about 60° Fah. I prefer to have the windows open both day and night. It is no doubt often difficult in cold weather to maintain a uniform temperature with open windows, but ventilation must never be sacrificed for heat. In wards which are warmed by large volumes of heated air constantly pouring in, there is not much risk of draughts from open windows, but even where the only means of heating is an open fire place, an abundance of fresh air may be admitted from the outside. I am well aware that Dr. Currie successfully treated a patient prostrate and delirious from typhus fever by exposing him naked to a cold draught from

an open window, and personally I would rather be treated in the open air than in a close stuffy room, but such extremes are neither necessary nor desirable. In such a disease as typhoid fever where the patient is liable to bronchitis and pulmonary congestion or even pneumonia, from the effects of the poison, I do not believe in increasing this mischief by making him breathe cold air. The patient is dull, stupid, intellectual faculties blunted, and perhaps delirious, but the reflex irritability remains intact. It may be occasionally necessary to arouse the nervous energy by cold affusion, cold bath, or a blast of cold air, but such powerful impressions should only be temporary, else they will soon exhaust the energy which they have roused into existence. It is generally supposed that pneumonia can be more readily induced by exposure while asleep than when awake; it is therefore unreasonable to imagine that, in a disease where the functions of the higher nerve centres are to a great extent in abeyance, strong peripheral impressions can be applied with impunity. Blasts of cold air, and cold baths will undoubtedly cool and rouse the patient, but if too prolonged, they must necessarily lead to internal congestions, not merely by lessening the circulation in the periphery, but by exhausting and paralysing the reflex irritablity of the vaso-motor nerves. In this disease there can be no objection to a certain amount of carpeting on the floor, and as a means of lessening noise it is decidedly useful.

The bedstead should be narrow and approachable from either side. It should be fitted with spring and hair mattresses. (Even in cases where the tank is used a bed will be necessary at some stages of the disease). Flock and feather beds, eider down quilts, and other non-conductors of heat should be strictly avoided. The patient should lie between linen sheets, and should only have an additional counterpane, or at most a single blanket and a light quilt. There are of course many serious cases, in which with a high internal temperature, the extremities are very cold, where the covering has to be considerably modified, and it may be even necessary to supply hot bottles to the limbs, and wrap them in flannel. All the clothing should

be kept scrupulously clean. In many cases it is necessary to use a water-bed to prevent bedsores, but from what I have previously stated it should always be remembered that the water-bed is, or should be, a warm bed, and it ought never to be used as an antipyretic agent. The patient should be removed each day, so that the water-bed and bedding may be aired, and the condensed perspiration dried. If there be much pyrexia the heating effect of the bed may be counteracted by lessening the coverlets, but as a rule the water-bed is only necessary at the later stages of the fever when the temperature is beginning to decline.

No matter how slight the attack the patient should be at once put to bed, and kept in the horizontal position during the whole course of the illness. In fact in all diseases bed is the proper place when the temperature is above the normal. The bedpan should be used from the beginning, but especially towards the later stages the patient should on no account be allowed to assume the erect or even sitting posture for fear of inducing fatal syncope. The patient should be kept very quiet, fed at regular intervals, and encouraged to sleep. The nurses should be kind, bright, cheerful, with noiseless tread, well versed in their duties, and should keep an accurate record of all events appertaining to the case.

Medicine. I have not much faith in giving a great quantity of physic in typhoid fever, and some of my earlier cases in the tank had almost none as I was anxious to simplify my deductions, but the tank in no way interferes with any other treatment which may be deemed advisable. If the patient come early under observation, and there be much retching or vomiting I am sufficiently old-fashioned to order an emetic, and of all emetics the simplest is the best. I prefer two or three tumblerfuls of hot water to anything else. If these symptoms occur at a later stage of the disease they are indicative of prostration with congestion of the stomach, or perhaps some cerebral affection, and should be treated accordingly, but no emetic should be administered. If the cause be referable to the stomach a sinapism should be applied to the

epigastrium, and an alkaline mixture, containing bismuth administered, or a few small doses of champagne given. If the vomiting be cerebral a sinapism should be applied to the nape of the neck, and a hypodermic injection of morphia, or morphia and atropine, given.

I always begin the case with a good calomel purge, about two grains, and throughout the illness when there is constipation I generally repeat the same remedy in about half-grain doses. I can see no objection to the saline purgatives, or castor oil, but I usually prefer calomel. It is however well not to get into any routine habit of using it. In case 52, much larger doses were administered than I am in the habit of prescribing, and when I found her salivated I discovered that she had had thirty-seven grains of the drug.

Constipation in this disease is frequently due to an inactive, and a distended condition of the large bowel, of which the natural secretion is defective, and consequently the liquid portion of the fæces becomes absorbed. The hard scybalæ may cause irritation, and set up a catarrhal flux which, however, is usually insufficient to effect their removal. The frequent small liquid motions may give rise to the erroneous impression that the trouble is diarrhœa rather than constipation. To empty the large bowel and lessen its torpidity, small enemata given daily or every alternate day will prove highly efficacious. To effect this purpose a pint of warm thin gruel, or the same quantity of soap and water, with, or without a little castor oil and turpentine, may be administered. Glycerine, and glycerine suppositories which induce hyperæmia and considerable irritation of the lower bowel, are strongly contra-indicated in this disease.

Sir William Jenner says :—" The most important, and a not unfrequent, cause of inaction of the bowel in typhoid fever is *deep* ulceration of one or more Pyer's patches. Large superficial ulcers favour the occurrence of diarrhœa, and are often accompanied by catarrhal inflammation of the mucous membrane. A single *deep* ulcer will paralyse the action of the bowel, and so cause constipation, and this has to be kept in mind as

a fact of the highest practical importance when it is proposed to relieve the bowels by an aperient. A deep ulcer is usually produced by the separation of a deep slough, and is often unattended by any catarrhal inflammation of the small intestine, or by any affection of the large intestine." Mild laxatives are always the best, and for this reason I prefer minute doses of calomel (which has also the advantage of being a good antiseptic), or simple enemata. No strong purgative should be given after the twelfth day, as the sloughs begin to separate about the thirteenth to the fifteenth day.

When there is prolonged constipation, and reason to fear deep ulceration with consequent greater liability to hæmorrhage and perforation, it is most important to lessen or remove the tympanitic distension of the bowels. This is best accomplished by an ice bag or cold compress to the abodomen, or by immersion in the tank; by the use of intestinal antiseptics with small doses of calomel; and by the administration of turpentine both by the mouth and in the form of an enema. If any hæmorrhage should occur, turpentine and opium are about the best remedies, while the effects of perforation are chiefly combated by the latter drug. We shall subsequently deal more fully with these complications.

Diarrhœa, as the usual concomitant of the disease, carries off peccant matter, and *per se* seldom requires any treatment. In some cases it may be so severe as to produce exhaustion, and then mild astringents with an antiseptic should be prescribed. About the best drugs for this purpose are aromatic chalk and opium powder, salicylate of bismuth, carbonate of bismuth, salol, catechu, kino, and dilute sulphuric acid with small doses of opium.

Whenever the diarrhœa is profuse the motions should be specially examined to see if there be any curds of milk, or other particles of undigested food; the milk and farinaceous articles of diet should be peptonised; and all animal broths, beef tea, fruit, vegetable juices, and excessive supply of liquids should be stopped. If the motions are very alkaline and strongly offensive, the necessity for intestinal antisepsis becomes paramount.

I am a strong advocate for the more or less routine administration of intestinal antiseptics. I formerly used salicylic acid suspended in milk, but since Rosenbach introduced naphthaline in this disease, I have been in the habit of prescribing it chiefly on account of its very slight solubility. More recently I have been using β-naphthol, and salol, and I now prefer the latter drug. In the alkaline contents of the small intestines, salol is decomposed into salicylic acid and phenol, and I consider it one of the best intestinal antiseptics which we possess. To an adult ten grains may be given every four hours, and if there be much diarrhœa ten grains of salicylate of bismuth should be added to each dose. When the bowels are confined one-twelfth of a grain of calomel may be given with each dose of salol. The great mistake in ordering calomel is in giving it in too large doses; one-half grain in twenty-four hours should be sufficient for any ordinary mortal who is suffering from typhoid fever. When I read of Liebermeister giving repeated doses of eight grains each, I am forced to conclude that Germans and Englishmen require different treatment. In a recent case β-naphthol caused considerable gastric irritation, which immediately subsided on the substitution of salol. The salicylate of quinine is a good antiseptic, and being a very insoluble salt, it will probably pass a long way down the intestinal tract before it is absorbed. It had better be used in small doses (two to four grains), and given with some other antiseptic, such as the salicylate of bismuth, salol, or salicylic acid. Quinine is said to be one of the best antiseptics against the bacillus typhosus of Eberth. All the antiseptics which I have mentioned can be given suspended in milk, or they may be administered in cachets.

I think the above antiseptics will usually be found sufficient, but I must not omit to mention some others which have been recommended. Sir William Jenner ordered finely powdered animal charcoal, but its bulk and appearance are against its use. Bouchard's original mixture was so repulsive, and offensively smelling, that I never tried it; but his more recent combination of β-naphthol and salicylate of bismuth is

certainly more palatable. Dr. Mitchell Clarke, of Bristol, has had good results with hydro-naphthol, which, however, does not seem to have much, if any, advantage over β-naphthol (of which it is largely composed), except that, being a patent article, it is more expensive. Others again prefer α-naphthol. Among the numerous other antiseptics which have been used, may be mentioned sulphurous acid, eucalyptol oil, thymol, and camphor.

Murchison, Niemeyer, and Sir Thomas Watson ordered chlorine water, and this treatment has been recently revived by Dr. Burney Yeo. The following is Dr. Yeo's prescription: — "Into a twelve-ounce bottle put thirty grains of powdered potassic chlorate, and pour on it forty minims of strong hydrochloric acid. Chlorine gas is at once rapidly liberated. Fit a cork into the mouth of a bottle, and keep it closed until it has become filled with the greenish yellow gas. Then pour water into the bottle, little by little, closing the bottle, and well shaking at each addition until the bottle is filled. You will then have a solution of free chlorine, together with some undecomposed chlorate of potash and hydrochloric acid, and probably one or two by-products."

"To twelve ounces of this solution for an adult, I add twenty-four or thirty-six grains of quinine and an ounce of syrup of orange peel, and I give an ounce every two, three, or four hours, according to the severity of the case—that will be from twelve to thirty-six grains of quinine in the twenty-four hours, according to the case." In Dr. Burney Yeo's practice this treatment has been very successful, and under its use he has noticed "a remarkable cleaning of the tongue and a disappearance of the offensive fœtor of the evacuations." He looks upon this mixture as an intestinal and general antiseptic.

Frontal headache is often a troublesome symptom during the first eight or ten days, but it then disappears spontaneously, and, as a rule, does not require any very active medication. The patient should be kept very quiet in a darkened room, and not be subjected to any unnecessary reflex irritation

Evaporating lotions, or even an ice-cap may be applied to the head, and if there be much heat the body should be sponged or placed in the tank according to the severity of the case. The following drugs will often be found useful:—Five grains of antipyrin with three of caffeine; one drachm doses of the elixir guaranæ: or twenty grains of bromide of ammonium, with three grains of caffeine. Attention should be directed to the state of the bowels, and to the diet.

Sleeplessness is an important symptom which should never be neglected, as the nervous system is sufficiently burthened with the fever poison without this additional source of exhaustion. I have generally left the choice of the hypnotic to the House-Physician, but personally I am in favour of Dover's powder. A good combination is a draught of chloral, bromide of potassium, and tincture of hyoscyamus, or, if there be much restlessness a small dose of morphia may be substituted for the henbane. At an advanced stage of the disease, sedatives, when employed, should be used cautiously. As a rule patients in the tank sleep well—frequently both day and night.

I have no faith in any of the new antipyretic drugs in this disease; they can do no permanent good, and may do a great deal of harm. Quinine and digitalis I prescribe, but not in the huge doses administered by our German colleagues. As a general tonic, especially towards the later stages of the disease, I am very fond of quinine, or bark, and generally combine it with caffeine. In some cases where the disease seemed to assume a slightly malarial type, or where the spleen was very large I have found benefit from three to five grain doses of quinine given thrice daily, and occasionally I have given ten grains at one dose, but this was rarely repeated on the same day. In the early stage of convalescence, in many severe cases, the temperature is easily disturbed from slight causes, owing to defective control of the thermo-taxic mechanism. Under such circumstances a powder composed of five grains of antipyrin, three grains of salicylate of quinine, and two grains of caffeine, may be given every four hours, or liquor ammoniæ acetatis may serve the same purpose. With these exceptions I

have never used quinine or digitalis in typhoid fever with the view of lowering the temperature.

When there is any bronchial catarrh or hypostatic congestion of the lungs, ammonia, caffeine, and digitalis are the most effective remedies. Where there is pulmonary congestion with general lividity I believe that peroxide of hydrogen may be given with advantage. In two cases I used considerable quantities with cold water enemeta, but when it is introduced into the stomach, from which it is readily absorbed, the dose should not exceed two to four drachms for fear of a too rapid liberation of oxygen in the blood. To those who use quinine and other antipyretics to diminish the oxygen carrying power of the blood this may seem a doubtful remedy, but I believe it will be found useful in such cases as I have indicated, and, moreover it is one of the most powerful antiseptics which we possess. The cases in which I used it occurred in October and November, 1890; I am, therefore, highly pleased to find its use in typhoid fever strongly commended by Dr. Benjamin Ward Richardson, to whose researches we owe all our knowledge respecting the peroxide of hydrogen. In the *Asclepiad*, October, 1891, Dr. Richardson says :—"The gas when liberated would diffuse through the whole of the canal, and would decompose and oxidize the decomposing exuded products, which, by secondary absorption, are the cause of the relapsing febrile seizures, with an efficiency possessed by no other remedy. It would be like exposing the decomposing ulcerated surface to sea air."

Diet. My early tank patients were kept chiefly on a milk diet, not that I have unbounded faith in milk, as it is a simple popular diet for such cases, and I was anxious that we should be able to estimate the value of the tank with as few disturbing influences as possible either from diet or medicine. Dr. Lauder Brunton does not approve of farinaceous food in typhoid fever as on several occasions it seemed to him "to afford a more favourable nutrient medium to the bacilli:" whether this be the result of more than a limited experience I cannot say, but I know men who have had largely to deal

with this disease, and who do not hold such an opinion. No doubt when the salivary and pancreatic secretions are much diminished, ordinary farinaceous diet is not advisable until it has been subjected to the amylolytic action of some of the many ferments in the market, but in the tank these secretions do not seem to be much diminished and the patients digest boiled bread and milk very well. When not digested it may readily increase the fermentation in the intestinal tract, but we have previously seen that this should be corrected by the use of antiseptics, and if there be reason to suppose that there is a deficiency of the salivary and pancreatic ferments their action should be assisted. I am convinced that in febrile diseases if we wish to lessen the increased combustion at the expense of the tissues, we must supply a fair amount of carbohydrates.

The best diet to prevent the wasting in typhoid fever has not yet been determined. Latterly I have been ordering carbohydrates very freely, and even butter with decided advantage to the patients, in lessening the waste of tissue. The loss of weight during the febrile process is to a considerable extent due to the dehydration of the tissues, but the water is afterwards quickly replaced, and this to a great extent accounts for the rapid increase of weight which usually takes place when the afebrile stage is reached. In the tank this dehydration is largely prevented, and I have seen the loss of weight continue after removal from the tank when there was nothing to account for it unless a loss of water which had been retained in the system. During the fever there is little or no tissue upbuilding and therefore the demand for nitrogenous food cannot be great, but if the pyrexia, which is inevitable, is not to be maintained at the expense of the tissues, we must supply an abundance of other fuel in the form of easily assimilable carbohydrates or hydrocarbons.

Milk is generally looked upon as a model food, because it contains all the ingredients necessary for repairing waste and supplying heat, but it does not necessarily follow that because the constituents are in the proper proportions for a growing infant, it is best suited for a fever patient where the conditions are

completely reversed. In the latter the anabolic functions are in abeyance, and the katabolic exceedingly active. Where milk is the only diet in fever, the tissue waste is exceedingly great. The nitrogenous element of food may be readily supplied by milk, but the sugar and fat are not in sufficient quantity in that fluid, and require to be supplemented from other sources. As Sir William Jenner has pointed out, a pint of milk is often more difficult to digest than a mutton chop, and whatever foods we order we should see that they are properly digested. The stool should therefore be carefully inspected, and when any curd of milk or other undigested food is present the diet should be peptonised. The addition of lime water, barley water, or isinglass to the milk renders the curds smaller and consequently more digestible. The milk had better always be diluted. Dr. Burney Yeo says: "Vichy water is a good diluent of milk; but a less expensive and very convenient method is to add to each cup of milk-and-water (half milk and half water) an alkaline tabloid composed of bicarbonate of soda, bicarbonate of potash, carbonate of magnesia (each two grains), and common salt, three grains. This will not only assist the digestion of the milk, but it will add certain necessary salts to the food, which, from the absence of vegetable foods, the patient does not get. Common salt is also an excellent antiseptic." I always insist on a liberal supply of chloride of sodium which is too frequently omitted from febrile diets.

During the febrile stage, the food, whatever it be, should be liquid and should be administered every two or three hours. I place no limit on the quantity of liquid nourishment, so long as it is retained in the stomach and properly digested, but for an adult I usually find that about four pints of milk, eight to sixteen ounces of bread, and two ounces of butter are appropriated daily, and there is no use giving any diet which is not assimilated. The bread should be boiled with milk, or it may be peptonised, and the butter added. In the tank the appetite soon becomes very good and these quantities do not suffice. Such farinaceous articles of diet as arrowroot, sago, tapioca, or some of the numerous infants' foods in the market may be given.

If there be constipation or not much diarrhœa, extract of malt will be found useful, and sugar may usually be given, also the expressed juice of ripe grapes but neither the skins nor seeds. If any stimulating effect is required, beef tea, mutton or chicken broth with vegetable juices, but no cellulose, clear soup, beef essence, kolatina, and coffee may be given and one or two raw eggs may be administered daily during any stage of the disease. The patient should be allowed to quench his thirst at any time with pure cold water, toast water, barley water, whey, or weak lemonade. Under this diet there is often considerable loss of weight, but the extreme wasting recorded by Cayley and others is not likely to occur. The liquid nourishment should be continued until the temperature has been normal for a week or ten days, and then we should begin cautiously with fish, chicken, mutton, lightly boiled eggs, sweetbreads, boiled tripe, game, etc. When the patient has been well fed during the fever his temperature is not likely to be affected when he begins solid food unless there be constipation, and this should not be allowed to occur. Recrudescences and relapses are often ascribed to the use of solid food when the occurrences are merely coincidences. Constipation with retention and accumulation of the fever poison is a more likely source of future mischief.

Alcohol. With three exceptions none of these patients had any alcohol during their residence in hospital. My views on this question are no doubt, to a great extent, a reflex of the teaching of my friend and master, Professor Gairdner; but not being a teetotaller myself, I am not likely to be accused of any prejudice on the subject, though any prejudice, based on the matured opinion of such a careful and accurate observer as Dr. Gairdner, could not be far astray. Alcohol is not a food in the proper acceptation of the word; it is a sedative, or to use a commoner though less accurate designation, a stimulant. It causes vaso-motor paresis, which is usually sufficiently accomplished by the fever poison without any assistance; this effect may be necessary during the chilly stage, during collapse, or to counteract the effect of a cold bath; but in a well-managed

case, without any heroic treatment, such influence should not be often necessary. In cases where there is a high body temperature, with cold extremities, alcohol will do good, and probably the best form of it for administration in such cases will be found to be good draught bitter beer. In the case of patients accustomed to alcohol, it may not be well to disturb any long-acquired habit; but this disease generally occurs in the young before any such habit has been established. During convalescence it may be, and no doubt often is, useful both for the stomach's sake and to relieve an exhausted heart by lessening peripheral resistance. We frequently hear of patients being "kept alive" for a certain number of days on brandy; but as these cases generally end in death, it would perhaps be more accurate to say that the only nutriment they had during the last few days of life was diluted brandy. The tenure of life held under such conditions is usually dearly bought.

As the result of my observations in the fifty-five cases recorded at the end of this essay, I think I have clearly shown that the most severe cases of typhoid fever may be treated throughout the whole disease without any alcohol. In the only case of death which I have had, alcohol was administered, not that I in anyway place these two facts in the relation of cause and effect, but the alcohol did not save her, and I am not aware that it did much good. In another case the champagne certainly did good by allaying the vomiting. The third case got a pint of beer daily, for a short time, to reconcile her to what she called "the cowld wather." A patient in the tank once complained to me that he was "very dry," a condition under such circumstances which none but an Irishman could understand, but even that appeal could not induce me to moisten him with a little whiskey. If I were convalescing from typhoid fever I should enjoy a little '68 port, and I do not care to prohibit others from what I would probably take myself. I have however established my point that typhoid fever can be treated without alcohol, and about the only time that that agent is of any value in a well managed case is during convalescence. As a food or antipyretic agent it is of very little value, and should

be avoided during the febrile stage, unless there be some special reasons for its use. The large quantities of alcohol which are frequently prescribed, must inevitably lead to asthenia and so protract convalescence.

Antipyretic Treatment. We have seen the views of Currie that "the febrile poison is the agent that excites the system into fever, which however is carried on, not by the continued presence and agency of this agent, but by the principles which regulate the action of life," and we now know that high temperature can work mischief irrespectively of the agent which induced it. It is however a mistake to suppose that all the evils of fevers are due to the high temperature, because apyrexia might be maintained throughout the whole course of the illness by the use of powerful antipyretic drugs, without modifying the course of the disease, or improving the patient's chance of recovery. The albuminous degeneration which occurs in the striped muscular fibre of the heart and voluntary muscles, in the cells of all the glandular organs and even in the nerve cells, is no doubt largely due to the high temperature, though I think the fever poison must also be partly credited with this degradation, because evidence of its existence can be found in all severe cases no matter how well the temperature has been subdued. The temperature, however, is the one factor in fever which can be most readily combated, and when this has been efficiently carried out by the antipyretic action of water the signs of degeneration are correspondingly lessened. For example in my tank cases the heart's action improved and there was no anxiety as to cardiac paralysis; the functions of the glandular organs were restored, and although the nervous irritability was heightened there were no signs of nervous exhaustion, and consequently convalescence progressed rapidly. Even in my only fatal case, which was that of the mother of a large family, who was exhausted by a severe attack and an equally severe relapse, all the organs were in a remarkably good condition. I have discarded the use of drugs as antipyretic agents, and I shall now consider the various methods of applying water for the reduction of the temperature.

Cold Affusion. To arouse the nervous system there is no agent like the cold affusion, but as an antipyretic agent its action is very evanescent. It may be applied to the head with much advantage when there is delirium or even severe headache accompanied with high temperature, but for lessening the fever other applications must be adopted. Currie's views on its abortive action cannot be entertained in the present day.

Cold Sponging. To refresh the patient the body may be sponged, even in mild cases, night and morning with cold water or water and vinegar, but if it is wished to reduce the temperature by this means the sponging must be carried out every hour or oftener while the temperature is high. The slight exposure of the body during the act of sponging also tends to reduce the temperature and stimulate the nervous system, but I am strongly opposed to any cooling process by exposure of the body to draughts of cold air, because any such excessive stimulation chills the body, exhausts the nervous irritability, and leads to vaso-motor paresis with internal congestions. Cold sponging is only suitable for mild cases.

The Wet-Pack. This is an excellent antipyretic agent but as generally carried out, by packing the patient for a very short time, or as Dujardin-Beaumetz recommends for ten minutes, it is absolutely useless. Case 25 was in the wet pack for five days, case 27 for eleven days, case 28 for nineteen days, and case 30 for twenty days. The patient should be enveloped in a sheet wrung out of tepid or cold water, and covered with a single blanket, or counterpane, or simply a linen sheet. As soon as the sheet begins to dry it should be replaced by another. If the circulation be feeble and the lower limbs cold, then they should be wrapped in a blanket, and the wet sheet confined to the trunk. The wet sheet is chiefly applicable to children and young spare patients, where there is a comparatively large cooling surface. It is a very convenient method but for severe cases cannot be compared with the tank.

Cold Compresses, the Ice-Bag, and Leiter's tubing. Such applications to the abdomen have a decided effect in lowering the temperature, but they are not to be trusted in severe cases.

Of these three methods the ice-bag is the most convenient, and it is exceedingly useful in cases of abdominal distension, and in intestinal hæmorrhage. Case 33 was very protracted and the ice-bag was constantly applied to the abdomen, from the seventeenth to the thirty-ninth day, and its action was then supplemented by that of the wet-pack for seven days. In case 22 Leiter's tubing was applied to the abdomen for four days before immersion in the tank. It had at first a decided effect in lowering the temperature, but it soon lost that control, and I am afraid it may have had some causal relation to the double pneumonia from which the patient afterwards suffered. The ice-cap applied to the head has a controlling influence over the body temperature.

Cold Water Enemata. I found iced water enemata very useful in three cases, in two of which the tank had not a sufficiently controlling influence. In order to obtain the cooling effect, the water should be retained so as to be afterwards excreted by the kidneys. Two and a quarter pounds of cold water at a temperature of 37° Fah., will reduce one hundred pounds at 105° Fah., a degree and a half, and in its passage through the human body it must have a similarly cooling effect. If the water injected be allowed to flow away immediately the effect will be very slight and transient. I therefore raise the patient's hips, insert in the rectum the nozzle of a syringe to which is attached a piece of india-rubber tubing through which the water is made to gravitate from a height of two or three feet. Cold water enemata have been freely employed by Cantani, but I think they will not be often required except in cases of emergency where it is necessary to rouse up the nervous system as well as to produce an antipyretic effect. For antiseptic purposes a pint of cold water with three or four ounces of the peroxide of hydrogen may be introduced by an O'Byrne tube several times a day.

Cold and Graduated Baths. I have already expressed my opinion of these agents, and I shall leave their use to others.

Warm or Tepid Bath. At the very commencement of an attack of fever, before we know the exact nature of the illness

with which we have got to deal, when the patient is chilly and restless, I think the cleansing and soothing effects of a tepid or warm bath will be decidedly beneficial.

The Tank. It consists of a well-made wooden box, about 6 ft. long, 2 ft. 10 in. wide, and 16 inches deep. It is lined with lead which is painted white and coated with a thick layer of shellac varnish. The shallac makes the tank, on other occasions, a convenient medium for administering electric baths. Each tank is provided with a large discharge pipe, which, in the case of these tanks, communicates with a soil pipe which leads down to the sewer ; the tank containing over 70 gallons of water can thus be emptied in three minutes. During the treatment of the first six, and partly of the seventh case we had only one tank which was supplied with an ordinary tap, and hence the cleaning each day was a rather slow process, and the patient was out of the water longer than was desirable. Moreover having only one tank each patient had to make room for his or her successor, and hence the period of immersion was not so long as I could have wished. We have now got two tanks in the ward, provided with a plentiful supply of hot and cold water, and good discharge pipes, so that the labour of the nurses is considerably lessened. Each tank is provided with a sheet of bedticken which would about allow the patient to be submerged, but at the head there is a strip about a foot wide which does not sink so deeply and on which rests an air pillow so as to keep "the head above water," which is a most essential matter in most conditions of human life.

The patient is wrapped up in a blanket and completely immersed except the head. It is important to use a blanket for this purpose rather than a sheet, because frequently a small portion of the chest rises above the water, and the blanket being a bad conductor of heat, this portion of the surface does not get chilled, which would happen if a sheet were used. The tank is covered with a half-lid, which prevents the weight of the bed clothing resting on the patient, a waterproof sheet, and bed clothing to keep in the heat of the water. The tanks could easily be provided with a small circulating boiler to maintain

a uniform temperature but this is quite unnecessary as we have found that the removal of a bucketful of tank water, and the addition of the same quantity of hot water every two hours is sufficient to maintain a fairly uniform temperature, and a variation of one or two degrees is a matter of no moment. A thermometer is kept constantly in the tank. As long as the patient's temperature in the mouth is over 100°, the temperature of the tank need not rise above 90° to 93°, but as the body temperature approaches the normal so should the tank temperature. We have not found it necessary to lower the temperature of the water below 90° nor raise it above 98°. A rise of a few degrees in the tank temperature is sure to send up the heat of the body though to a less extent, and by regulating the heat of the water there is no fear of any collapse, as the temperature of the body cannot fall below that of the surrounding medium.

I have been anxious that these patients should be disturbed as little as possible, and so have enjoined them to pass their urine and fæces into the tank. The fæces are to a considerable extent retained in the blanket, and this is soaked for some days in a strong solution of perchloride of mercury and hydrochloric acid before being washed. A fresh blanket is used each day. I know this is not a very æsthetic proceeding, and it would be a very simple matter in cases where there was not much diarrhœa, to swing the patient while his bowels were being moved. In this case there would require to be a second sheet, over the bedticken, with a hole in it for the buttocks. Where there is much diarrhœa, or where there is incontinence of fæces, as happened in some of these cases, I still think that the less the patient is disturbed the better. Any day on which there was no motion the tank was not cleaned.

So far as the patient is concerned plain water of a given temperature is all that is required, but for the sake of others it is as well to have it as antiseptic as possible. At first I simply used boric acid, but latterly, for several reasons partly assigned under the seventh case, I have tried to render the water aseptic. This patient developed the disease in hospital, but

after a careful and impartial investigation we were convinced that he must have contracted it outside. We used sulphate of iron with a small quantity of sulphuric acid, but the iron oxidised, and the water was rendered so dirty in appearance by the red oxide that we discontinued it. We then tried perchloride of mercury with chloride of ammonium and hydrochloric acid, but this began to mercurialize the patient and so had to be discontinued. Those who are fond of inunction in syphilis might find this a very convenient method for introducing the mercury. Dr. Logan made some cultures from the fæces contained in the mercurialized tank water, and he reports, *inter alia* :—"But undoubtedly a very large proportion of the germs in the first case were dead. You might look upon the water as sewage water, but sewage water in which there were actually fewer germs than there would be in the same quantity of tap water." We also used boric acid, common salt, and hydrochloric acid, but this mixture irritated the patient's skin. Possibly if the patient's skin were well protected by a coating of some mineral fat, such as vaseline, a strong antiseptic might be used. This question requires solving; probably it will be found best in the majority of cases to raise the patient above the water while the bowels are being moved. In the ward there is a large supply of perchloride lotion (1 in 2,000) for nurses and others to wash their hands after handling the patient.

Such was my original description of the tank, but with increased experience I have gradually effected various modifications which I shall now describe. Strong objections have been urged against the fæces being passed into the tank, the force of which objections I have fully recognised, and tried to obviate. Mr. Thomas Duncanson fitted up for me his new patent bed-lift, whereby the patient can be wound up as easily as you would raise a window blind. Inside the tank there is a light wooden frame which fits closely to the sides of the tank but has sufficient play so as to be easily movable when raised up or let down by the bed-lift. The frame is composed of four strips of wood of about one and a half inches deep and three

quarters of an inch thick, and is provided with feet of about six inches long to prevent it reaching within that distance of the bottom of the tank: it is also provided with rings to which the hooks from the bed-lift are attached when it is wished to raise the patient. The frame had even better be constructed in the form of a treble-inclined plane, like an Ilkley couch. The bedticken is fastened on to the frame so tightly as just to prevent the body of the patient from resting on the bottom of the tank; the strip of ticken, and the air or water pillow for the head are also adjusted to the frame. By these means the patient can be easily raised for sanitary purposes, or when from any cause it is desirable to remove him from the tank. After the patient has been a short time in the tank the diarrhœa abates, so that the trouble is correspondingly lessened.

Notwithstanding these appliances we did not succeed in preventing the fæces from being passed into the water, for the simple reason that I specially designed the tank treatment for very severe cases, and such patients pass their urine and fæces involuntarily, or are too ill to give any notice of such occurrences. The following means, however, allow the patient to pass the fæces in the tank but prevent them mixing with the general body of water. The discharge pipe is connected with a very large funnel, or closet pan, which comes down from the centre of the bottom of the tank, and there is a hole cut in the bedticken over the pan. A water-pillow with a hole in its centre is fixed in the sheet of bedticken to prevent the cut edges from fraying the patient's skin. The patient's buttocks rest on the water-pillow so that when any fæces are passed they immediately gravitate into the pan, and they can be immediately discharged by raising the plug or turning the tap of the discharge pipe. When the water is flowing out it rushes round the buttocks of the patient, and down the hole in the water-pillow so that any excreta which may be adhering are washed away.

The porter is directed to place every morning a shovelful of the chloride of lime on the grid of the wet water-trap into which the discharge pipe empties the tank water. It is important to disinfect the fæces and tank water, but in my experience this

is not quite an easy matter when you have got the patient in the water. However a few handfuls of some heavy disinfectant such as the sulphate of iron could be occasionally dropped into the tank-pan. My friend, Major Beamish, of Her Majesty's Prison service, has drawn my attention to the strong disinfectant properties of "Ferozone." It is composed, according to Sir Henry Roscoe, of :—

Ferrous Sulphate	26·64
Aluminium Sulphate	2·19
Calcium Sulphate	3·30
Magnesium Sulphate	5·17
Combined water	8·20
Moisture	24·14
Silica	11·35
Magnetic oxide of iron	19·01
	100·00

The great objections to its use in the tank are the insoluble constituents, silica, and magnetic oxide of iron, as thus the cleaning would be rendered much more difficult. A combination of the first four ingredients might prove a useful mixture. The great dilution of the fæces together with a free supply of any crude and cheap disinfectant is pretty certain to render them innocuous ; and the abundant supply of water will flush the sewer, and prevent any risk of stagnation.

As I have previously stated still-water is a bad conductor of heat, and to prevent or lessen the evening exacerbation of febrile temperature it is frequently advisable to empty the tank several times during the afternoon, and refill it with a stream of water at 90° to 95°, running over the patient. In fact the most perfect system would be to treat the patient in a running stream, and then it would not often be required to reduce the temperature of the water below 95°. The stream of warm water could be introduced at the bottom of the tank, and an equal quantity would be discharged from the surface by means of an overflow pipe. This could be readily carried out in a fever hospital where there are always a large number to treat, and for the water supply I would have a large cistern in which the water could be always kept at any requisite tem-

perature. In warm climates, such as India, there should be very little difficulty in keeping the water warm, and it would be much more comfortable for the patient to lie in the tank, than to swelter in an atmosphere of 90° to 100° in the shade. When the patient is permanently taken out of the tank, there is usually a febrile reaction, unless the temperature has been normal for a day or two, and to prevent this occurrence it is advisable to apply cold compresses, or an ice bag to the abdomen.

Effects of the Tank Treatment. (a)—*Temperature.* We are not here discussing the intimate nature of fever. Those who wish to do so will find much original work in the writings of Professor Wood, of Philadelphia, and in the Gulstonian Lectures of Dr. MacAlister there is an excellent epitome of current views on the subject with a good working hypothesis as to the mechanism of the pyrexia. Increased temperature is a natural phenomenon of fevers, and it is a disputed point how far its mere reduction is beneficial, but the general consensus of opinion attributes to high temperature the power of working mischief irrespectively of its origin. So long as the fever is mild there is no necessity for interfering with the temperature, and in any case there is more to be lost than gained by attempting to produce any continuous apyrexia. With the patient in the tank, the body heat is to a great extent under control, but so far as the temperature is concerned I have made no attempt to do more than moderate the fever. I have noticed again and again in the Weir-Mitchell treatment that so long as the temperature in the axilla does not exceed 100° F., tissue upbuilding is easily effected, but once the body heat much exceeds this the massage should be stopped and the diet lessened, or in other words damp your furnaces, and lessen your fuel. So in fevers the anabolic changes play a small part in the tissue metamorphoses, and hence we get rapid wasting. Life implies change, and the greater the change the greater the vitality so long as the anabolic changes compensate the katabolic, but in fevers the increased combustion of the tissues tends in the direction of their death rather than their renovation.

In the continued fevers with a persistent high temperature, and no marked intermissions there is no period for upbuilding, and hence it frequently becomes a question how long will the vitality of the patient hold out? It is therefore very important to moderate the intensity of the pyrexia, and if possible to have a prolonged daily remission with a reduction of the temperature to at least 100° or 99° Fah. If the reduction of temperature be accomplished by a mere abstraction of heat without any diminution in the production, there cannot be much gain. We want a true antipyretic action where the thermogenesis is diminished, the thermolysis regulated, and the thermotaxic mechanism improved. This is what, I am convinced, the tank accomplishes. There has been no attempt to prevent, but only to moderate the usual evening exacerbation, but this is gradually lessened in intensity and duration, the remission becomes greater and longer, and the mean daily temperature is lowered, while, when the patient is daily removed from the tank, there steadily appears a diminished tendency to disturbance in the thermotaxic mechanism. I hoped to have been able to give some evidence of the tissue changes by an examination of the excretions in the tank, but I soon found that the sources of error were too great to make this laborious process worth attempting. I will again refer to this under the weight.

The seventh case was an exception to the dictum of Wunderlich :—" When the temperature is 40° (104° Fah.) from the first or second day of the attack, the disease is not typhoid fever." In this case the evening temperatures of the first, second, third, and fourth days were 104°, 103°, 104·6°, and 104·2°, while the morning temperatures of the second, third, fourth, and fifth days were 101·8°, 101·2°, 101·4°, and 103°. From this time till the evening of the eighth day when he was placed in the tank there was a continuous fever between 103·2° and 104°. Independently of the dysentery, this was one of the most severe cases of typhoid fever, not even excepting the fatal cases, which I have ever seen. The ninth case was only admitted to hospital on the seventeenth day of the disease. She was in a feeble condition with a pulse of 144, and a

temperature of 104·4°. She was placed in the tank at 95°, and her temperature fell about 2 degrees. On the morning of the nineteenth day Dr. Wallace found that her temperature had fallen to 98° and she appeared rather livid and collapsed. It seemed as if the blood was not warm enough to stimulate her exhausted heart. He removed her from the tank and applied hot bottles to her surface and the lividity quickly disappeared. She was then ordered a mixture of caffeine and belladonna. The nurses should keep a careful supervision over both the temperature of the patient and of the tank. In case 21 the circulation was extremely feeble and the tank had not sufficient control over the internal temperature, so that on one occasion it rose to 105·4°, and was maintained at a high level until she had some cold water enemata. During the relapse, which in this case ended fatally, the iced water enemata had to be frequently repeated. In case 22, which was very severe, and complicated with double pneumonia there were several very serious evening exacerbations which in his condition had to be combated by iced enemata. In future I should treat such patients more in a running stream, the principles of which I have previously enunciated. In case 21, it is quite possible that she was two days too long in the tank, because when her temperature tended to become subnormal, her weak heart may not have had sufficient stimulus, and she was not in a position to stand any collapse temperature. It is probable that if I had been present towards the end I might have transfused a saline solution.

(β)—*Circulatory System.* There is a marked improvement in the vaso-motor tone; the blood vessels become smaller and firmer; the pulse slower, fuller, and of improved tension—of course you must not mistake the small firm pulse for a weak pulse. The heart maintains its vigour, and the only cases where the sounds have been dull have been those cases where the patients were not put into the tank till a late stage of the fever; but in no case have I had any fear of cardiac paralysis, not even in the dysenteric case with a pulse of 152. Of course there might be a danger in placing a patient in the tank at the

end of the third week with an exhausted heart, as the weak organ might not then be able to cope with the increased peripheral resistance. *Caeteris paribus* the greater the resistance the less the frequency of the pulse, but when the resistance almost overtops the reserve cardiac energy the frequency again increases; such was the case in the dysenteric patient, and he then received tincture of belladonna for a few days. The second case was placed in the tank at the beginning of the third week, his heart was exhausted and he was much benefited during convalescence by caffeine; probably the addition of belladonna or alcohol would have been useful.

There was hæmorrhage in two of these cases, but I am inclined to think that the tank lessens the liability to that complication, because, without doubt, the improved vaso-motor tone extends to the abdominal vessels, as shown by the lessened diarrhœa, the diminution in the distension of the abdomen, and the rise in the arterial tension. Of course improved tone and tension will not prevent hæmorrhage from ulceration into a blood vessel, and such I believe to have been the case in these two patients. I may have something further to say on this subject and also regarding the other cases of hæmorrhage when I come to speak of the treatment of complications. In the production of the heightened tone of the blood vessels and increased blood tension, there is one element which must be duly appraised, namely, the mechanical pressure of the water. When the body is immersed, there is, in addition to the weight of the atmosphere, a surface pressure averaging nearly one quarter-pound to the square inch. This pressure is transmitted to every part of the body with the exception of the internal surfaces of the air passages and vesicles, and it must greatly aid in carrying on the venous circulation, and materially aid the right side of the heart in propelling the blood through the lungs. When the chest is expanded in inspiration, the venous blood is driven into the blood-vascular thoracic cavity with greater momentum, and the right ventricle is stimulated to more vigorous contraction.

(γ)—Respiratory System. The respirations lessen in fre-

quency; the bronchitis and congestion of the lungs improve and soon disappear. In the fourth case both lower lobes were almost solid from hypostatic congestion, and the heart's action was very feeble. Under ordinary circumstances I would have prescribed caffeine and ammonia for this patient, but I was anxious to elicit the effect of the tank, with the view of deducing its probable influence in pneumonia, and I have been so fully satisfied in this respect, that the first severe case which comes under my care shall be treated in the tank. Such was the statement which I made when the ninth case was under treatment, and I now merely wish to supplement it.

Several of the cases since have had hypostatic congestion, and in case 22 there was very pronounced double pneumonia. In all cases the lung complications progressed very satisfactorily. If I have not yet carried out this treatment in cases of simple pneumonia it is because simpler measures have been successful. Moreover I believe in treating cases of pneumonia in a dry atmosphere, and it is difficult to prevent a certain amount of vapour from rising from the tank, though this is quite possible, and I intend to put some severe cases in the tank. I have very little faith in the so called "bronchitis kettle" for any affection of the respiratory organs situated below the larynx. When there is a tendency to œdema of the lungs the tank had, perhaps, better be avoided. In such cases the constrained position in the tank, and the weight of the water rather interfere with free breathing. If, therefore, œdema of the lungs should supervene, I would take the patient out of the tank, and envelope him, from the neck to the knees, in a linen sheet wrung of iced-water. The circulation in these cases is invariably feeble, and consequently the extremities readily become cold; the feet and legs should therefore be wrapped in a dry blanket. The only other covering usually necessary is a dry sheet. The wet sheet should be changed as often as may be required to keep the rectal temperature under 103°, and not below 100°. If it be allowed to exceed 103°, the high temperature exhausts the feeble heart, and the œdema rapidly progresses; on the other hand, if it fall below 100° there will be the danger of the stimu-

lus being insufficient to keep a weak heart working. This may seem heroic treatment, but it must be recollected that we are dealing with one of the most fatal types of typhoid fever. In these cases a moderate allowance of alcohol, and stimulants, such as caffeine and ammonia, will do good.*

(δ) –*Digestive System.* The improvement in the digestive tract is perhaps more marked than anywhere else. The tongue becomes moist and clean, the salivary secretion increases, the appetite and digestion improve, and the diarrhœa not only lessens, but the character of the motions change for the better. In the fifth case the diarrhœa alternated with the two periods of immersion: and in the dysenteric patient the diarrhœa, which had quite ceased towards the end of the period in the tank, again returned to a certain extent after his removal. With two exceptions, the diarrhœa lessened to one or two motions daily soon after the patients were placed in the tank, and not infrequently a small dose of calomel had to be administered. In case thirteen the diarrhœa continued rather profuse for seven days, and in case eighteen for four days. The lessening of the diarrhœa, and the prevention of collapse when the temperature of the tank is maintained, would suggest it as a medium for the treatment of Asiatic Cholera. In this case the temperature of the tank would require to be kept at 98° to 100°, and possibly higher in the algide stage.

(ε)—*Nervous System.* The delirium disappears, and the general well-being of the patient greatly improves. Cases four and five were sufficiently roused up from their lethargic condition to enable them to express, in no uncertain sounds, their dislike of the water. The decided beneficial effects of the second immersion in each of these two cases spoke strongly in favour of the tank. We have already referred to the increased vaso-motor tone, and the very heightened neuro-muscular irritability in many of these cases made us, at first, think that the tank might have too stimulating an effect on the nervous system. In the first case the knee-jerk was not tested, and in

* In a recent apparently hopeless case this treatment has been very successfully carried out.

the second and third cases only at a late stage of convalescence. In the fourth, fifth, sixth, seventh, eighth and ninth cases there were markedly exaggerated knee-jerks and ankle clonus. In the tenth, eleventh, twelfth, thirteenth, nineteenth and twenty-second cases there was well marked ankle clonus. In the other cases it was absent, or not detected, as it was only occasionally looked for. During canvalescence the clonus soon disappeared, and the knee-jerks returned to normal.

In meningitis (cases 5 and 28) the knee-jerks were frequently absent. The fifth case was not taken out of the tank on account of the meningitis, as previously I had two very successful cases of meningitis treated in the tank. The best remedy for meningitis, in my experience, is the ice-cap while the temperature is above normal, and this could not have been well applied on this case in the tank. There is no disease where improved vascular tone is more demanded, and this is accomplished by the tank. Regarding internal medication, of course the immediate condition of the patient must be treated, but, as a general rule I prefer a calomel purge, followed by a combination of salicylic acid and Dover's powder. In the early stages of this case there was a question of diagnosis between typhoid fever and tubercular meningitis; the absence of the rash and knee-jerks told in favour of the latter, the bronchitis did not decide either way, but the characteristic typhoid stools, and distension of the abdomen settled the question in favour of the former. The knee-jerk and ankle clonus afterwards became very pronounced, though they slowly lessened during the progress of the cerebro-spinal meningitis. A friend suggested that possibly the tank may have given rise to the otitis, and the otitis to the meningitis. This theory was bound to receive due consideration, though I still held to my opinion that these conditions were rare complications of the fever. The otitis started and ended in the middle ear, without any affection of the throat or external ear. Although the cerebral condition was somewhat relieved by the discharge of pus through the perforated drums, it did not subside with the healing of the ears, and the spinal mischief was in no way

affected. When the patient was put into the tank a second time, her cerebro-spinal, as well as her general condition, greatly improved. The neuro-muscular irritability in typhoid fever has been fully investigated by Dr. Angel Money, and I can refer to his paper in *The Lancet* of November, 1885, and to my own article on "The Treatment of Meningitis" in *The Liverpool Medico-Chirurgical Journal*, January, 1891.

(ζ)—Urinary System. The urine was passed into the tank, and very few observations were made in any case. I had hoped to have made a quantitative estimation of the amount of urea in the tank, but this was found to be impracticable. The albumen soon disappeared in those cases in which it was detected. During the febrile stage of all cases, the urea is considerably increased, and the chlorides diminished. Under the head of diagnosis I have sufficiently referred to Ehrlich's test.

(η)—Weight. The first four cases were not weighed before being placed in the tank. The net weight of the fifth case on admission to hospital was 43 lb., and during nine days, seven of which were spent in the tank, she lost 7 lb. During the second period of four days in the tank, she gained 1 lb. The net weight of the sixth case fell from 97½ to 92 lb., during the six days in the tank. In the seventh case the net weight fell from 115 to 95 lb., during the first 27 days in the tank, and during the remaining four days he gained 3¾ lb. In the eighth case the net weight fell from 127½ to 117½ lb. in 10 days. In the ninth case it fell in 25 days in the tank from 52¼ to 41½ lb. In the tenth case from 95¼ to 89½ lb. in 13 days. In the eleventh case from 93 to 85 lb. in 11 days. In the twelfth case from 50 to 47 lb. in 16 days. In the thirteenth case from 167 to 150 lb. in 27 days. In the fourteenth case from 152 to 142 lb. in 17 days, of which 15 days were spent in the tank. In the fifteenth case from 120 to 111 lb. in 6 days. In the seventeenth case from 73 to 69 lb. in 24 days. In the eighteenth case from 131 to 128 lb. in 15 days. In the nineteenth case from 122 to 111 lb. in 8 days, of which he was only three days in the tank. In the twenty-first case from 118½ to 96 lb. in 27 days. In the twenty-second case the weight fell from 151 to

139 lb. in 7 days before he was placed in the tank, and from 139 to 119 lb. during 19 days in the tank. The loss of weight in these cases has been very considerable, but the wasting did not appear so extensive as I have previously seen it in severe cases of typhoid fever, nor at all so great as has been recorded in some cases by Cayley and others. The wasting is a natural result of the fever, and should be prevented as far as possible by a well-regulated dietary.

(*h*)—*Skin.* The horny layers of the palms of the hands and soles of the feet get quite macerated, but on the skin of the body generally there is very little effect, with the exception of a slight roughness and elevation of the papillæ.

(*i*)—*The Tissues Generally.* There is marked diminution in the dehydration of the tissues, which takes place in all febrile conditions; this is very apparent in the case of the tongue, which maintains its proper size and keeps moist. I know that a great many eminent authorities state that there is a retention of fluid in the system during the febrile process. There is an intravascular retention especially in the veins, to fill up the paretic vessels, but a retention in the tissues is quite inconsistent with a high temperature; dropsical conditions follow the fever, and are associated with a feeble circulation. The intravascular retention hampers the action of the heart, whereas the improved vascular tone and tension associated with the use of the tank, diminishes the bulk of fluid in circulation and so increases the effective force of the heart.

Such are the effects which you may hope to derive from the use of the tank in typhoid fever. It is not a specific for that or any other disease, but it is a specific treatment for the patient; by placing him in an improved environment his system is better able to adapt itself to, and to overcome, the altered conditions attendant on the fever. It may be said that the number of cases is too limited to draw conclusions, but if I can only induce others to put the method in practice we will soon accumulate a sufficient number of cases to satisfy the most ardent Baconian. Inductive philosophy is all very well in its proper place; it helps us to take stock of

our progress and to remove any excrescences which may have grown in our theories, but, so far as I am aware, no advance either in science or anything else has ever been effected by this process of reasoning. The method is too slow for the minds of those who are moving in the van of progress. To wait for the accumulation of observations from which a general law can be affirmed may suit dullards, but progressive minds cannot wait for nor submit to this levelling process. It may be said that general laws can only be established by induction from observed facts, but long before such laws are generally accepted they have become axioms to the minds of those who have deduced them from other well-known or ascertained facts. The mere process of observing facts is not reasoning, and we must have some deduction to guide the direction of our observations if we do not wish to make our minds mere repositories for the storage, perhaps, of rubbish. "Reasoning is nothing but the faculty of *deducing* unknown truths from principles already known." We are content with this definition of Locke; deductive philosophy has been our guide in the past, and we are satisfied when the accumulation of observations establishes the truth of our inferences. Bacon and his philosophy we largely leave to statisticians and to those who try to reap where they have not sown.

THE TREATMENT OF COMPLICATIONS.

Typhoid fever is specially liable to many complications and therefore in every case we should be in a condition of "armed expectancy," but we should not fold our arms and wait for complications to arise. The temperature chart should be carefully watched, and any disturbance from the regular course of the disease should make us look out for the cause. Any undue rise of temperature with hurried respiration and quickened pulse should direct our attention to the chest. The treatment of such affections as bronchitis, hypostatic congestion of the lungs, pneumonia, and pleurisy must be conducted on general principles and will not detain us long. The three first of these conditions can be well treated in the tank, but pluerisy may demand some stimulating applications, such as a mustard and linseed poultice to the affected side. These complications are generally supposed to demand stimulants, but the stimulant should be more especially ammonia, or ammonia, caffeine, and bark or quinine, but not alcohol. In hypostatic congestion of the lungs and pneumonia there is a vaso-motor paresis which requires to be counteracted by a vaso-motor tonic, and not intensified by alcohol. A good combination consists of fifteen grains of carbonate of ammonia, two grains of caffeine and one drachm of the ammoniated tincture of quinine given in an effervescing mixture, with ten grains of citric acid, every four hours.

Meningitis. This compartively rare complication is best treated by an ice-cap, salicylic acid and Dover's powder, or opium and calomel. With the treatment of Meningitis I dealt very fully in *The Liverpool Medico-Chirurgical Journal*, January, 1891.

Hæmorrhage. A sudden fall of temperature, a blanched anxious face, and a small weak pulse should direct our attention to the occurrence of hæmorrhage, even before the blood has appeared in the stools. If the patient be in the tank, he

need not necessarily be removed, though it is perhaps better to take him out and keep him out, so long as the temperature remains low. A large ice-bag should then be kept constantly applied to the abdomen. The peristaltic movements of the intestines should be prevented by repeated doses of opium. The best hæmostatic is perhaps turpentine, in ten minim doses, every hour or two. In these cases there is usually defective arterial tone, to counteract which ergot should be administered, or ergotin injected hypodermically. If the patient is fainting, he should have a little champagne or brandy. Stimulants should only be temporarily used to prevent fatal syncope. Until the hæmorrhage has ceased, the stomach should not be troubled with much food, and this should only consist of beef essence, soup, peptonised gruel, and whey. If there be any vomiting, the patient should have ice to suck or swallow, and small nutrient enemata may be given.

Graves looked upon hæmorrhage from the bowel as frequently a critical evacuation which did not demand any interference, and Trousseau latterly held that hæmorrhages in typhoid fever are usually of favourable augury. No doubt epistaxis, and even hæmorrhage from the bowel at an early stage of the fever from congestion of the mucous membranes is not a matter of much importance, but profuse hæmorrhage about the end of the third week from ulceration into a blood-vessel is a fact of the gravest significance. The patient is not then in a position to bear the loss of blood, and the sudden fall of blood-pressure places his life in imminent danger. The horizontal position should be strictly maintained, and if the loss of blood has been great, the foot of the beadstead should be raised so as to depress the patient's head below the rest of his body. All unnecessary disturbance of the body should be avoided, and the urine may be drawn off with a catheter.

Trousseau further says :—"I would not wish, however, to be represented as saying that these hæmorrhagic complications, hitherto looked on as always serious, are really quite free from danger. They are in too many cases exceedingly serious. The hæmorrhage may by its profusion destroy the patient, just

like any other loss of blood; and you have heard of death resulting from intractable epistaxis. Intestinal hæmorrhages are also formidable, when, by recurring they exhaust the patient and cause him to fall into a state of anæmia and debility, leading to extinction of vital power, and ataxic nervous symptoms such as occurred in one of the three cases I mentioned. Finally, intestinal hæmorrhages really are serious complications of typhoid fever, when, occurring along with bleeding from the nose, gums, lungs, urethra, or along with sub-cutaneous hæmorrhage, they are symptomatic of a dyscrasia against which the resources of art are powerless. I am now speaking of hæmorrhages which constitute one of the characteristics of the disease to which our predecessors gave the name of 'putrid fever' as a distinctive term, and which at present we call 'hæmorrhagic putrid fever;' but in these cases it is not, strictly speaking, the loss of blood which kills: death is the result of the peculiar morbid condition which constitutes putridity."

In many cases a moderate epistaxis does good at the commencement of an attack by lessening the general vascular turgescence, and so relieving an overburthened heart. With the diminution in the mass the effective force of the heart is increased, provided the loss be not so great as to materially affect the arterial tension. In the hæmorrhagic cases the cardiac contractions are invariably feeble, the arteries are dilated and deficient in vaso-motor tone, the capillaries are turgid, and the venous system is overloaded. To use an engineering term, the *head* of the liquid is low, and consequently the velocity is diminished. Again the velocity is inversely as the sectional areas; hence in the dilated and overloaded capillaries the velocity is lessened, and with the increase in their fluid contents the lateral pressure within them is augmented. The capillary resistance is directly proportional to the length of the tubes, and inversely proportional to the squares of their cross sections. Resistance tells backwards in the course of the circulation. Obstruction to the flow of blood into the arterioles and capillaries raises the arterial tension,

and venous engorgement raises the pressure within the capillaries. The dilated arterioles and capillaries lessen the resistance to the heart, and so the arterial tension, which is already low from the feeble action of the central pump, is still further reduced; the *head* of the liquid is lowered, the velocity of the blood diminished, and its statical condition within the capillaries increased. The lateral pressure is still further heightened within the capillaries by the overloading of the venous radicles and general venous system. The conditions are most favourable for the rupture of the capillaries, and it is from these vessels that the blood comes in the hæmorrhagic cases. The temptation to enter fully here into the physics of the circulation is very strong, but it would carry me too far beyond the purpose of this work, and, moreover, I have on several previous occasions dealt very fully with the subject.

The indications for treatment in these hæmorrhagic cases are to, (*a*) increase the force of the cardiac contractions, (*b*) improve the vaso-motor tone, and (*c*) lessen the general venous turgescence. Of course the general hygienic surroundings, and the diet of the patient must receive due attention, as in other cases. For the first two indications the best drugs are ammonia, caffeine, nux vomica, and turpentine. To meet the second and third (and also indirectly the first) indications, the immersion in the tank will prove of invaluable service. The stimulating effect of the tepid water increases the vaso-motor tone, and thus contracts the arterioles and capillaries, augments the resistance to the heart, and so calls forth more energy—the velocity is quickened and the statical conditions diminished. The pressure of the water (amounting on an average to about a quarter of a pound to the square inch) hurries on the venous circulation, lessens the resistance to the capillary flow, and relieves the heart. Blood-letting in such cases would do much harm by reducing the arterial tension (which is already far too low) without any favourable effect on the other factors. In fact in ordinary cases of intestinal hæmorrhage, about the end of the third week, the great fall of arterial pressure is fre-

quently followed by capillary hæmorrhages, so that the case assumes a purpuric character.

Perforation.—Opium should be freely administered, and the patient kept on a starvation diet. Surgical interference has been proposed, but it is very doubtful if, under such circumstances, it would do any good in the great majority of cases. I think it will usually be best to trust to a natural process of inflammation gluing this portion of the intestine to another coil. I have, however, seen such excellent results from surgical interference in many cases of intestinal obstruction, that I would certainly commend an operation if I thought the patient strong enough to bear it. In the *Medical News*, November 21st, 1891, Dr. Weller Van Hook, of Chicago, records three cases of laparotomy for intestinal perforation in typhoid fever, with one recovery. Dr. Hook has collected the statistics of nineteen cases of operation for perforation with four recoveries; but in seven of these cases (including three of the recoveries) it is very doubtful that the patients were suffering from typhoid fever.

Peritonitis.—When this follows on perforation the treatment will be similar to that of the condition which induced it. When it occurs as a rare complication of typhoid fever without any antecedent perforation, it should be treated on general principles. The circulation in the abdomen and the distension of the bowel should be lessened by an ice bag or cold compresses applied to the abdomen. The intestinal congestion should be diminished by small and repeated doses of calomel and opium, and if there be constipation or only slight diarrhœa small doses of some saline such as sulphate of soda should be given as frequently as is requisite. It should be remembered that peritonitis does well with free purgation, but no drastic or irritating purgatives can be tolerated. The pain should be completely subdued by opium. There is, no doubt, frequently a certain amount of localized inflammation of the peritoneum over the floors of the ulcers and the enlarged mesenteric glands, but this is a conservative leison which, *per se*, requires no special treatment. Antiseptics should be freely administered,

and as a rule I have more faith in the ice-bag in these cases than in warm applications, especially when there is much fever. In one case where the pain and tenderness over the spleen were so great that an abscess was feared, great benefit and relief were afforded by hot fomentations.

Tympanitis. There is always, or nearly always, a certain amount of flatulent distension of the abdomen in typhoid fever, but excessive tympanitis usually occurs when there is great nervous prostration, and should be treated accordingly. Here again an ice-bag, or cold compress to the abdomen does good. Intestinal antisepsis should be practised to lessen fœtor and prevent decomposition of the contents of the bowel. The food should be peptonised, and benefit will usually accrue from the use of such nervine tonics as ammonia, quinine, and caffeine. In the tank the tympanitis invariably disappears. Sir William Jenner says:—"Want of power to expel the flatus, and excess in the quantity formed, reach their maximum as a rule about the latter half of the third and during the fourth week of the fever, for then the sloughing and ulcerative processes of the walls of the intestine are at their height, the nerve power is at its lowest, and the contractile energy of the abdominal and intestinal muscles is consequently at its minimum; while, from the state of the stomach and the secreting glands generally, the antiseptic digestive processes are in a great degree arrested, and the food that finds its way into the intestines mingling with the fœtid secretions from the diseased intestines, and with the sloughing particles separating from the solitary and agminated glands and from the floors of the ulcers, readily undergo gas-generating decomposition." The causes which lead to tympanitis are here well portrayed, but it seems to me that in a well managed case any excessive distension should be removed before the third week, and should not be allowed to recur. The more distended the small intestine, *cæteris paribus*, the greater the risk of hæmorrhage and perforation.

Diarrhœa. This very seldom requires any treatment. It can usually be kept within bounds by giving peptonised starchy foods, diminishing the milk supply, and cutting off all flesh

juices. When the motions are very profuse and watery, opium and chalk powder may be given, or starch and opium enemata. Vegetable astringents may be prescribed, and antiseptics, such as salol and salicylate of bismuth, should never be omitted.

Constipation. Sir William Jenner has pointed out that this condition, when persistent, is frequently associated with deep ulceration and a greater liability to hæmorrhage; and such is my experience. It should be counteracted by mild laxatives, such as calomel, salines, or castor oil, and any overloading of the rectum should be removed by enemata.

Retention of Urine. The possibility of such an occurrence should always be kept in mind, though it rarely happens.

Bed Sores. This is largely a question of good nursing. When any such occurence threatens a water-bed should be used.

Albuminuria. This is a valuable indication as showing the state of the circulation. It indicates renal congestion, and is associated with defective cardiac energy, diminished *vis viva* in the circulation, and vaso-motor paresis. Such conditions are improved by the tank, and vaso-motor tonics, such as caffeine, digitalis, strophanthus, ammonia, and quinine.

Thrombosis and Embolism. In both these conditions the part affected should be kept warm and at perfect rest. Ammonia should be freely administered, and frequently opium is of great service.

Peripheral Neuritis. This is usually best treated during convalescence by massage, electricity, and nervine tonics. The condition which has been termed "the typhoid spine," is due to wasting of the erector spinæ muscles, and perhaps to inflammatory mischief about the smaller vertebral joints and ligaments. It is best treated by massage, tonics, and nutritious food.

Otorrhœa. The ears should be syringed with a weak warm alkaline solution, to which a little peroxide of hydrogen or sanitas has been added. They should be then dried and filled with powdered boric acid. This should be done daily or oftener so long as the discharge is free.

Such *sequelæ* as general debility, anæmia, neuralgia, imbecility, or insanity should be treated, on general principles, with good food, fresh air, and tonics. Where there has been great wasting, massage and good feeding soon renovate the muscles and restore strength.

TABULAR STATEMENT OF FIFTY-FIVE SUCCESSIVE CASES OF TYPHOID FEVER, WITH ONLY ONE DEATH.

Twenty-two cases were treated in the tank.

Eleven cases received some form of special treatment, such as the wet-pack, &c.

Twenty-two cases received symptomatic treatment.

Ages of Patients.—There were twenty-one cases under fifteen, twenty-nine cases between fifteen and thirty, and five cases over thirty years of age.

Day of Illness on Admission to Hospital.—Eighteen cases were admitted before the ninth day; twenty-one cases between the ninth and fourteenth days; eight cases between the fourteenth and seventeenth days; six cases between the seventeenth and twenty-first days; and in two cases the day was not determined.

Albuminuria.—Albumen was present in the urine at one period or other in twenty-seven cases; in nine cases the urine was not examined, and in the remainder of the cases, when the urine was examined, there was no albumen present.

Lenticular Rose Spots.—These were found in thirty-five cases; in the other cases they were either not present or not noted.

Spleen.—The spleen was enlarged in forty cases; in ten cases its size was not noted; and in five cases it was apparently not enlarged.

Ankle Clonus.—This was present in twenty-six cases, absent in twenty-two, and not noted in seven cases.

Hæmorrhage.—Intestinal hæmorrhage occurred in four cases.

Meningitis occurred in two cases.

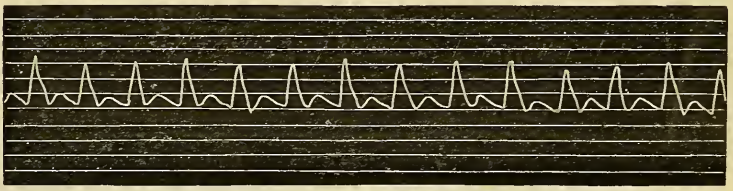
Lungs.—The respiratory organs were more or less affected in thirty cases.

Relapses.—In case 18 there was a recrudescence and an indefinite relapse after he had been treated for the original attack in the tank. Case 21 relapsed in the tank. The tank, therefore, does not prevent relapses, but, at the same time, I am of opinion that it does not increase the liability to such occurrences. It must be remembered that the most severe cases were treated in the tank. In cases 15 and 16 the relapses, but not the original attacks, were treated in the tank; in the former case the relapse began on the nineteenth day, and in the latter on the thirty-eighth day. The 42nd case relapsed on the twenty-fourth day.

CASE 1. *Severe case of Typhoid Fever; Bronchitis; Immersed in the tank for nine days; Cure.*

T. C., aged 18, seaman, admitted June 14, 1889. He is a well-developed, well-nourished, temperate youth, with a good family and previous history. He took ill on June 6th, with frontal headache which soon became so severe that he "could scarcely see." He lost his appetite and became very weak and unfit for duty, but there was no shivering, nor any diarrhœa. Twelve days previously to this his vessel was lying in Dunkirk, but he lived on board, and never slept in the town. The water used on board was from a river in Germany, had a bad taste, and was not boiled.

On admission he appeared very ill; lips parched; tongue tremulous, dry, brown, glazed, and fissured; sordes about teeth; he complained of thirst. There were slight pain and tenderness over the abdomen and gurgling in the right iliac fossa. There were about half-a-dozen, elevated, rose-coloured spots which disappeared on pressure, scattered over the abdomen, and about an equal number over the back. Pulse 92, soft, compressible and fully dicrotic.



T. C., 15-6-89, Pulse 94, Pressure 2 ozs.

The temperature rose in the evening to 104·6° Fah. Urine acid, sp. gr. 1026, no albumen. He was placed on a milk diet, and ordered six grains of naphthaline every four hours.

The following morning (9th day of disease), the temperature had fallen to 102°, but rose to 104·2° at 4 and 8 p.m. On the 10th day temperature was 102° at 4 a.m., and at 8 p.m. 105·8° was recorded. On the 11th day the temperature was 104° at 4 a.m. and 105° at 8 a.m. He had now been for two days in the condition of low muttering delirium. His lips were dry and cracked; teeth covered with sordes; tongue very tremu-

lous, very dry, brown, glazed, and deeply fissured transversely. There were numerous mucous râles all over chest, but no consolidation, nor any expectoration. He was now in a very serious state, and I was of opinion that very prompt measures would have to be adopted to enable him to survive for ten days or longer, until the attack had subsided. Accordingly at 4 p.m. on the 11th day of the disease (June 17th) his temperature being 105°, I had him immersed in the tank, the water of which was 95° Fah.

The following are the four hourly records of temperature during next 24 hours, 104·2°, 103·6°, 102·6°, 102°, 102°, 102°. He was then taken out of the water for an hour to have the tank cleaned, and at 8 p.m. temperature was 102·8°, but by midnight it had fallen to 99°.

June 19th (thirteenth day of disease). The delirium entirely ceased within twelve hours after he was placed in the tank and has not since recurred. His tongue is still tremulous, but moist and covered with a white fur at the edges, dry and transversely fissured in the centre. Pulse has fallen to 80, small and somewhat feeble but considerably increased in tension. His temperature ranged to-day from 99·6° at 8 a.m., to 103° at 8 p.m. The evening rise was partly due to his being out of the tank in the afternoon for about an hour, but the temperature still presents the usual diurnal variations with an evening exacerbation.

June 20th. Patient is doing very well. Pulse 80, better volume than yesterday. Respirations 24. Tongue moister. His temperature to-day ranged from 101·4° to 102·8°. He had three loose motions to-day, but there has been at no time any profuse diarrhœa, and in fact up to the 11th day of disease when his bowels were opened by an enema, there was constipation.

June 21st. The patient this morning is very comfortable. Pulse 80, regular, fair volume. Tongue less cracked transversely but coated with a moist fur, and he takes nourishment better. His temperature at 8 a.m. was 100·4°. When he was out of the water at noon while the tank was being cleaned, his temperature rose to 103·6°. Soon after being replaced in the

water, it fell to 101·8°, but rose at 4 p.m. to 103°. The temperature of the tank was now reduced to 90° Fah., and his temperature fell to 101·2° at 8 p.m., but rose to 102·6° at midnight. There were an unusual number of fluctuations in the temperature to-day, which I partly ascribed to a want of uniformity in the tank temperature. Two motions to-day.

June 22nd. Tongue quite clean and moist. Pulse 80, regular. He is taking nourishment well, and beginning to crave for more substantial food. On examination of lungs there are still some bronchitic râles. Two motions to-day. There was a steady fall in the temperature to-day, except a rise at 4 p.m. to 102°, when he was out of the tank; the records were 4 a.m., 101·4°; 8 a.m., 100·6°; 12 noon, 100°; 4 p.m., 102°; 8 p.m., 101°; 12 midnight, 98·8°. The temperature of the tank was again raised to 95° Fah. His body temperature remained normal the following day except for an evening exacerbation to 101·2°. One motion.

June 24th (eighteenth day). Progressing very satisfactorily. Pulse 80, regular, fair volume; tongue clean and moist. One motion. Temperature ranged from 98·8° to 100°.

June 25th (nineteenth day). Doing well and feels well. Pulse 80. One motion. Temperature ranged between 98·8° and 99·2°.

June 26th (twentieth day). Tongue clean and moist. Pulse 80, regular and fair volume. One motion. Bronchitis nearly well. He was ordered to-day, in addition to his milk diet, chicken broth, fish, and one egg. A mixture of nitro-muriatic acid and cinchona was substituted for the naphthaline. He was taken out of the tank altogether this afternoon, having been immersed for nine full days; the temperature afterwards rose to 100·6°, but fell the following morning to normal. There was a slight evening exacerbation during the two following days after which his temperature continued quite normal. Convalescence was now quickly established. His appetite became ravenous and on July 4th (the 28th day from the onset of the disease) he was allowed ordinary diet. He was not weighed on reception, but he seemed to me to lose less

flesh than is usual during a severe attack of typhoid fever. His weight on July 12th was 128 lb., and on the 19th 132 lb. He was discharged quite well, and fit for work on July 22nd. There was very little diarrhœa in this case throughout, the brunt of the illness at first fell on the nervous system and lungs. The delirium disappeared ; the tongue became moist and clean ; the lung phenomena improved ; the pulse became slower, stronger, and of better tension ; the appetite returned ; the temperature moderated ; and the general well-being of the patient was very decided.

CASE 2. *Severe case of Typhoid Fever ; Immersed in the tank for eleven days ; Cure.*

O. A., aged 22, Norweigian sailor, was admitted to hospital on August 12th, 1889. When he left Odessa, seven weeks previously, he was quite well, but five weeks later, or two or three days before reaching Malta, he began to lose his appetite, got out of sorts, and felt sick. For eight days he has suffered from vomiting and diarrhœa, and has been confined to bed. He is a tall, lanky, spare but muscular man, who seems to have enjoyed good health previously to the present illness. It is rather difficult to fix the exact date of the commencement of this disease, but he seems to have become sick, in his own words, "in his belly," about thirteen days ago, though he has only been confined to his bed for the last eight days.

He is now suffering from well-marked typhoid fever. The rose-coloured lenticular spots are fairly numerous ; there is considerable tenderness in the right iliac fossa, and the motions are liquid and of a pea-soup character ; the spleen is enlarged. He is exceedingly prostrate, very apathetic, and lies on his back in a listless manner regardless of passing events. His tongue is tremulous, fissured, and covered with a dry brown fur. Pulse quick, small, and dicrotic. His arteries are rigid and rather tortuous. He was placed on a milk diet, and ordered six grs. of naphthaline every four hours. At 8 p.m. on the night of admission his temperature rose to 105° Fah., and he then received a dose of antipyrin.

The following morning at 8 o'clock his temperature had fallen to 101·6°, but at noon it had reached 103°. He was soon afterwards placed in the tank at a temperature of 95°, but even then his temperature continued to rise a little, and at 4 o'clock, 103·6° was recorded.

August 14th (sixteenth day of disease), 8 a.m. temperature 97·8°; noon 101°. He was now taken out of the tank, and his temperature quickly ran up to 103° He was out of the water about an hour, but at 4 p.m. temperature was 103·4°; at 8 p.m. 103°. From this date the temperature kept steadily falling, each morning and evening records being lower than those of the preceding day. At no time after the twentieth day of the disease did the evening temperature exceed 101°; while on the twenty-first and succeeding days the morning records were normal or subnormal.

The progress of the case was very satisfactory throughout; within 24 hours of his being placed in the tank, his dry, brown, cracked tongue had become moist; he was much livelier, and there was no appearance of any delirium. He expressed himself as feeling quite comfortable. His pulse had become slower and less dicrotic, and after the first day did not exceed 84 in the tank. He was taken out of the tank on August 24th (twenty-sixth day of disease), when the temperature had been about normal for 24 hours. After this there was an average rise of a degree to a degree-and-a-half, and the evening temperature did not sink below 100° till the thirty-second day of the disease. The temperature of the tank was throughout between 90° and 95°. For four or five days before he was taken out of the tank, there was a great craving for food, but he was kept on milk till the twenty-fifth day, when he was allowed bread and butter.

September 5th.—He is progressing very satisfactorily and gaining flesh. Superficial arteries very rigid and tortuous; pulse feeble; heart sounds dull. The patellar reflexes are present but not exaggerated. He was placed on ordinary diet and given a caffeine mixture.

September 13th.—Weighed to-day for the first time 123 lb.;

20th, 124 lb.; 27th, 129 lb.; Oct. 4th, 131 lb. On the latter date he was discharged quite well and fit for work.

The macerating effect of the water on the hands and feet of this "horny-handed son of toil" was very marked, and it was a long time after he left the tank before they had assumed their natural appearance, and during the process of exfoliation the keratin smell was rather offensive. I have never previously met with such atheromatous arteries at such an early age.

CASE 3. *Typhoid Fever; Immersed in the tank for six days; Cure.*

O. O'N., aged 14, was admitted to hospital on August 1st, 1889, complaining of pain in the back and legs, and vomiting. He looked very ill. His present illness began on the 17th, with pain in the back and legs, vomiting, and headache, so that we reckoned the day of admission as the fifth day of the disease. His mother is phthisical. He is a tall, spare boy; has an anxious expression; lips and nails livid; tongue covered with a thick white fur. The heart's impulse is very visible in the 2nd, 3rd, and 4th interspaces, and is distinctly peristaltic; the dull percussion extends to an inch and-a-half outside nipple line, and reaches to the second costal cartilage; sounds clear, second rather accentuated. There are numerous rose spots on the abdomen, which, however, has been rubbed with a liniment by his mother. There is gurgling, pain, and tenderness in the right iliac fossa. The motions are loose and of the usual pea-soup character. Urine acid, sp. gr. 1030, distinctly albuminous. Temperature 102°. He was placed on a milk diet, and ordered half a grain of calomel each day for four days.

24th (eighth day). At 4 p.m. yesterday the temperature had reached its maximum since admission, viz., 103.2°, but since then it has steadily fallen to 100·8° at 8 a.m. At 10 a.m. his pulse was 104, soft, weak, and fully dicrotic. At 11 a.m. he was put in the tank at a temperature of 90°. After this his temperature rose slightly, reaching 102° at 4 o'clock, but it then began to fall. At 4.30 his pulse was 84, and improved in tension. Respiration quiet, and lungs healthy.

26th (tenth day). The temperature fell yesterday at noon to 97°, and rose in the evening to 99°. At midnight it had again fallen to 96°, and the temperature of the tank was then raised to 95°, and by 8 a.m. his temperature had reached 99°; the tank was again reduced to 90°. At 4 p.m. the temperature in his mouth was only 97° and pulse 60, so the tank was now raised to 95°, and maintained at that temperature. Tongue clean and moist, one loose motion to-day.

27th. Craving for food. Temperature about normal; from this date till the time he was taken out of the tank on August 30th, the highest record was 99·4°.

29th (thirteenth day). He is progressing very favourably. Pulse 84, small, compressible, and of moderate tension; tongue clean and moist. He complains much of hunger. Bowels rather confined, motions solid, pale yellow, and not very offensive. Allowed bread and butter. He was taken out of the tank on August 30th (fourteenth day). The morning temperature remained normal, but there was an exacerbation of two or three degrees every evening till the 23rd day of the disease. After his removal from the tank the frequency of his pulse increased about ten to fifteen beats for a few days. When his urine was examined on September 2nd, it was free from albumen. On the 20th, he was placed on ordinary diet. The following are the records of his weight:—September 13th, 74 lb.; September 27th, 78 lb.; October 4th, 83 lb.; October 11th, 86 lb. During his residence in the hospital his medicine consisted of two grains of calomel. The patient was discharged October 11th, quite well.

Case 4. *Severe Case of Typhoid Fever; Hypostatic Congestion of the Lower Lobes of the Lungs; Sixteen days in the tank; Cure.*

Sarah K., aged 20, hawker, was admitted to hospital on August 30th, 1889. This patient was in such a stupid lethargic condition that it was impossible to get any information from her as to the history of her illness; but it was elicited from her mother that eleven or twelve days previously she

complained of loss of appetite, cough, and headache. She continued at work till a week ago, since which time she has been confined to bed, and has suffered from diarrhœa with offensive motions. She suffered from sickness, and complained of pain in stomach; she has been very thirsty, and rambled much at night. She was under medical treatment for a few days before admission, and received large doses of quinine.

Her eyes are dull, countenance stupid and devoid of expression. Tongue exceedingly dry and deeply fissured transversely; skin hot and dry; temperature 104°; respirations quick and shallow; pulse 110, small, soft, dicrotic, and so very feeble as scarcely to move the lever of the sphygmograph. Over the lower lobes of both lungs, percussion dull, vocal resonance and fremitus increased, breathing tubular, and a few crepitant râles in inspiration—in short, well-marked signs of hypostatic congestion.

There are many distinct rose-coloured lenticular spots over the abdomen; tenderness and gurgling in the right iliac fossa. Spleen large. She was ordered milk diet, no medicine. She was placed in the tank at a temperature of 90° Fah.

August 31st. She is now (3.45 p.m.) sensible, although still very stupid and dull of hearing. She says she will be ill, "a fortnight again Monday"—that is, she became ill on the 19th. Her breath has a very heavy and offensive smell. Tongue is becoming moist. Respirations 36. She says she is feeling better, but does not like "the wather." Her temperature fell this morning to normal, and so the temperature of the tank has been raised to 98°. It will shorten my remarks on her temperature by stating that from this date till her removal from the tank on the 11th (twenty-fourth day of disease), the morning temperature was usually about 99°, and the average temperature of sixty-three observations during this period was 100·6°.

September 1st (3.30 p.m.). The patient is rather better to-day. The tank has been maintained, as far as possible, at a temperature of 95° to 98°. She is more sensible, but still very deaf. Her tongue is moist, and the cracks are less. The

breathing is not quite so hurried, respirations 30. Pulse 96, small, weak, and compressible, but tension better. There is slight cough, but no expectoration. The percussion over both lower lobes still dull, but the breathing is less tubular, and there are fewer râles. Her bowels were moved once this morning, motion light yellow in colour, semi-solid, and not very offensive. She did not sleep much last night, but has done so to-day. It seems she has never had a bath since infancy, and does not now take kindly to the water. Ordered one grain of calomel.

2nd (fifteenth day). There is considerable improvement though she passed a restless night. Tongue tremulous, fur more moist, cracks less. She is sensible, but still very deaf; she is nervous and grumbles much at the bath. There is great improvement in the lungs; the percussion is clearer, breathing less tubular though respiratory murmur is still very feeble; there are fewer râles.

Sixteenth day. The patient spent a much better night, sleeping for the greater part of the time, but when awake she is not reconciled to her watery bed. She is still apathetic and deaf, but expresses herself that she feels "right enough." Tongue moister and slightly fissured, feels thirsty, bowels opened to-day. There is considerable improvement in the condition of the chest, percussion clearer, respiratory murmur fuller, and only very few râles. Repeat calomel powder.

Seventeenth day. Passed a very restless night, but has slept well to-day. Her general condition is better, respirations 26. Repeat calomel, and to have half-a-drachm of sulphonal to-night.

Eighteenth day. Slept well last night and during the greater part of to-day. She is progressing favourably.

Twentieth day. She continues to progress favourably. Her temperature is only moderately febrile; to-day it rose to 102·2°, when she was taken out of the water to have the tank cleaned. Tongue coated with a moist creamy fur; bowels opened. She drinks freely. She sleeps very well at night, and has had no sulphonal since the night it was ordered. She is quite inteligent but still highly nervous and rather deaf.

Twenty-third day. The temperature of the patient is maintained at a rather high level, having ranged for the last three days between 100° and 102·6° The temperature of the tank, which has hitherto been 98°, is now reduced to 90°. Tongue moist, appetite good, bowels open; she looks very well and comfortable.

Twenty-fourth day. The temperature of the patient has fallen, since the lowering of the temperature of the tank. Her grumbling to-day about the "cowld wather," is so incessant, that I complied with her request and had her removed from the tank. She is now looking very well, and her temperature (4 p.m., before removal from water), 99·2°.

Twenty-fifth day. This patient was taken out of the tank yesterday at 7-30 p.m. After this her temperature steadily rose till it reached 103·2° at midnight. To-day it is fluctuating between 101° and 103°. She is drowsy, more stupid, and very deaf, and the nurse reports that she has been delirious all day. Tongue clean, but dry and parched. Pulse 132, small and weak; respirations 30. She had a loose motion to-day, light yellowish pea-soup appearance, and offensive smell. Her abdomen is not distended, seems rather tender on pressure, especially in the right iliac fossa. Splenic dulness measures six by five inches. Hepatic dullness four and-a-half inches in line of sternum. Percussion clear over the back, but breathing is rather harsh, and there are a few rhonchi. Ordered six grains of naphthaline and half-a-grain of calomel every four hours.

Twenty-seventh day. For the last two days her temperature has ranged between 101° and 104°, and it is now (4 p.m.), 104·2°. She is delirous, passes her urine and fæces unconsciously. Motions loose and offensive. Ordered to be replaced in the tank at a temperature of 90°.

Twenty-ninth day. Immediately after she was placed in the tank her temperature began to fall, and at 4 a.m., yesterday, it had sunk to 98°. It has not since risen above 100°. She is quite sensible to-day, but not at all reconciled to her new quarters. Pulse 120, small and weak; respirations 20. Tongue moist. She complains of thirst. Eyes bright and clear. Motions

loose, dark-greenish colour. Urine and fæces still passed unconsciously. She objects to the naphthaline, but says she does not mind what she takes if she only gets something to eat. The naphthaline is now stopped, and she is ordered half-a-grain of calomel, and five grains of aromatic chalk, twice daily. From this time the progress was uninterrupted, and she was finally taken out of the tank on the 31st day of the disease, after having been immersed for two periods of twelve and four days respectively. The temperature now became subnormal, ranging between 97° in the mornings and 99° in the evenings.

October 2nd (forty-fifth day). The patellar reflexes are exaggerated and there is marked ankle clonus.

12th. Patellar reflexes about normal only slight ankle clonus. The following are the records of her weight without clothing: September 30th, 82 lb.; October 7th, 85 lb.; October 18th, 90 lb.; October 25th, 94 lb.

November 3rd. She is now and has been for some time quite well. All her organs and secretions healthy. Discharged to-day.

CASE 5. *Severe Case of Typhoid Fever; Cerebro-Spinal Meningitis; Double Otitis Media; Immersed in the tank for eleven days; Cure.*

Margaret O'B., aged 8, was admitted to hospital on September 16th, 1889. The patient is a spare, fairly healthy looking child, weighing 43 lb. She became ill eight days ago, with chilliness and pains in the stomach. She has been since in bed and for some days has suffered from diarrhœa. She is easily roused up and gives intelligent answers to questions. Lips dry and cracked, sordes on teeth. Tongue rather tremulous, coated with a dry brown fur. Pulse 116, full, soft, and compressible. Respirations quiet. No rose spots to be seen on abdomen but numerous flea-bites all over the body. Abdomen distended and tender, but no gurgling in right iliac fossa. Splenic dullness three inches by two and three-fourth inches. Heart sounds normal. Some bronchitic râles over the

posterior aspect of both lungs. Skin dry and hot, temperature 102° Fah. in axilla. Motions very loose, offensive, and yellow ochrey colour. Patellar reflexes absent. Milk diet.

September 17th (tenth day). Temperature 102·2°. Motions very loose, pea-soup character, and offensive. Urine, 20 ozs. in 24 hours, alkaline, sp. gr. 1015, albuminous.

Eleventh day. The temperature fell this morning at 4 o'clock to 99°, but afterwards steadily rose and at 4 p.m reached 104·6°. Diarrhœa profuse. Body hot and dry, extremities cold, and altogether the patient appears very ill. She was put into the tank at 8 p.m. Temperature of water 95°.

Twelfth day. After she was placed in the tank her temperature steadily fell, and at midnight had sunk to normal, and remained so till noon to-day, when it began to rise and reached 102·6° at 8 p.m. Her temperature has hitherto been taken in the axilla, but while in the tank it is directed to be taken in the rectum. Pulse small and compressible, but not markedly dicrotic. Has a slight cough, respirations 24. She appears comfortable and sleeps most of the time. The bowels are freely moved, but the diarrhœa has considerably abated since she was placed in the tank.

Thirteenth day. Patient not quite so well, tongue is rather dry, pulse quicker (140), small and weak, and she is more fretful. Pupils large, face flushed and rather purple. She is quite sensible. Tank to be lowered to 90° till her temperature falls nearly to normal.

Fourteenth day. Her temperature was 100° at 4 a.m., 101·4° at 8 a.m. It then steadily fell to 97° at 8 p.m. It was now decided that the tank should be kept at 95° during the night and 90° during the day. Her lips and tongue were moister to-day. Pupils not so large. She did not sleep well last night, and coughed a good deal.

Sixteenth day. For two days her temperature has ranged between 98·4° and 100·4°. Tongue clean and moist. Pulse 144, tolerably firm. Pupils slightly reduced. Sleeps well, but has cried herself hoarse when awake.

Eighteenth day. Tongue clean and moist, pupils moderately

dilated. Pulse 144, fair tension. She has been found thrice with one angle of her mouth just under the water. Her head is much retracted on the spine. She is in a peculiar mental condition, cries continually with a widely opened mouth, varied by a dry cough and occasional eructations of gas. Refuses to answer any questions. Protrudes her tongue as far as possible, rotates it on its long axis, and then closing her mouth retracts it slowly doubled up between the teeth. She slept well last night. Cheeks not so flushed. Her temperature has been slightly higher, reaching 101°, yesterday and to-day. There is now evidently meningitis, and from the position of her retracted head it was not considered safe to leave her in the tank to-night so she was removed at 6 p.m. Her net weight was then 36 lb., having lost 7 lb. during her nine days residence in hospital.

Nineteenth day. The following is Dr. Wallace's note of to-day. "Patient slept well last night and was quiet after having been taken out of the tank, but was restless at times. She lies on her right side with the head retracted. Pupils large; face flushed; breathing pretty rapid and sighing, frequently interrupted by a short dry cough. She often opens her mouth widely and protrudes her tongue. There is a considerable amount of frothy saliva in her mouth. She has not taken any notice of any person or thing since yesterday morning. She is thirsty. She passes both urine and fæces involuntarily and there is increased diarrhœa. The abdomen is slightly retracted. There is great increase of both patellar reflexes, especially the right; and there is marked ankle clonus, which is long continued in the right side. The lower limbs are rather rigid, the thighs are acutely flexed on the abdomen and the legs on the thighs. There are no deep reflexes in the upper limbs which are rather rigid and the forearms flexed on the arms. Just at this moment she protruded her tongue four or five times from her widely opened mouth, turned her head slowly to the left and back again. Her eyes look mostly to the right and downwards, but are not fixed. Could not find the optic disc. Pulse 164, pretty firm. Respirations rather rapid

but not easily counted on account of her almost constant cough." Her temperature rose to-day to 103° in the axilla. I ordered her hair to be cut, and an ice-cap to be applied to her head, and to be given a powder, containing four grains of compound ipecacuanha powder and six grains of salicylic acid, every four hours.

Twentieth day. Dr. Wallace noted this morning that she "Slept quietly for several hours last night after taking Dover's powder and salicylic acid. She asked several times this morning for drink and answered a few questions with apparent intelligence; she lies quietly with a rather vacant stare; her pupils are dilated. She does not protrude her tongue or turn her head about so much as yesterday. She rolls her eyes about a good deal, but won't now answer questions, though her attention seems attracted by the voice. There has been a quantity of pus discharging from both ears to-day, the right membrana tympani cannot be distinguished owing to the quantity of pus coming from the middle ear. The left tympanic membrane is much inflamed, and in the lower anterior quadrant is seen a recent perforation the size of a pin's head from which pus of a very fœtid odour flows. The reflexes are still exaggerated. Pulse 164. Respiration tranquil. Dry powdered boric acid is used for the ears."

At 3 p.m., I noted that the cerebral symptoms presented by this patient last night were found to have in part disappeared this morning, when Dr. Wallace discovered for the first time suppurative double otitis media with perforation of both drums. The temperature has however been steadily rising and at noon reached 103·6°. Her throat is not affected. The pulse is again becoming more frequent. She has now assumed a more natural position, appears intelligent, and occasionally replies to questions or gives indications that she does not wish to be troubled. Her head is still very much retracted; the muscles of the upper limbs rigid, and the flexors so much contracted that the fore-arms are acutely flexed on the arms, the thumbs are adducted to centre of palms, and the fingers are flexed. The lower limbs are drawn up, the thighs flexed on the abdomen, and the

legs on the thighs, and the feet are extended. Ankle clonus, and patellar reflex still marked; plantar reflex increased, but the other superficial reflexes are barely if at all elicited. The liver is considerably enlarged, moves with respiration, and the lower margin can be seen just above the umbilicus. There were eight loose motions to-day. To continue the salicylic acid and Dover's powders. The temperature was 103·8° at 4 p.m.; 100° at 8 p.m.; and 99·2° at midnight.

Twenty-first day. Dr. Wallace noted: "Patient lies in the same position as yesterday, but the head is not so much or so persistently retracted. The patellar reflexes are difficult to elicit. Ankle clonus slightly marked on right side, easily elicited and long sustained on left side. Patient has slept well all night, and this forenoon, except when roused for her food and medicine, when she calls for her mother, and answers simple questions. She does not now gape and protrude her tongue and cry. Her pupils are strongly contracted. There was a copious discharge from the left ear during the night, the perforation in the drum is not yet sufficiently large for the efficient drainage of the tympanum, though it is slightly increased since yesterday. The right tympanic membrane shows a large ovoid perforation. Urine and fæces passed involuntarily, but the diarrhœa has lessened. Three loose motions to-day, of a yellow colour, with bits of curd in them, acid in reaction, and not very offensive. The respirations are 20 per minute deep and slightly snoring. Pulse 140, fair tension. The upper limbs are not so rigid nor so much flexed as yesterday afternoon." The temperature ranged between 99·4° and 102·8° to-day.

Twenty-second day. This patient seems to have improved since yesterday; she is intelligent, frequently calls for her mother; the cough is not very troublesome; respiration quiet; pulse 136; tongue moist; bowels open; motions light yellow, and not very offensive. She lies on her side, with her thighs and legs acutely flexed; the rigidity is rather less. Pupils normal. She is very much emaciated, and notwithstanding the fact that she has lain on a water-bed since her removal

from the tank, bed sores are beginning to appear over the sacrum, trochanters, and elbows. Ordered to-day peptonised bread and milk, and to have ten grains of aromatic chalk-powder with opium when motions are very loose.

Twenty-third day. Dr. Wallace notes:—"This patient continues to improve. The attitude is still one of flexion, the lower limbs being rigidly flexed, and any attempt to straighten them is attended with pain. The upper limbs can be easily straightened. It is difficult to estimate the patellar reflex owing to the firm contraction of the flexors. Ankle clonus hard to elicit. The threatened bed sores are not advancing. Patient has become quite sensible, and answers questions intelligibly. Her face is flushed; pupils rather small. She complains of pain in right ear, and there has been copious discharge from both ears during the night. The tympanic membranes have lost their red, congested appearance. She has still diarrhœa, and passes urine and fæces involuntarily. She slept moderately well last night, and takes her food well. The temperature reached 101° last night, being 2° less than the previous evening and 3° less than three days ago. Pulse 112 good tension. Respirations 20; tranquil. Percussion of right back clear. There are still some medium crepitations."

Twenty-fourth day. "At 3-30 yesterday afternoon, the patient had a slight rigor, and at four o'clock the temperature was 104·2° Fah. From this time it steadily declined, and at eight a.m. it had sunk to 99·6°. She slept moderately well. She is now particularly sensible and answers questions intelligently, but is a little drowsy, probably from opium. She complained last evening of pain behind the left ear, but there was no puffiness, and this was probably due to angular pieces of ice, as she has lain much on the left side. The lower limbs are still rigidly flexed, and cannot be straightened without causing pain. Ankle clonus not obtainable. To-day, the head is slightly retracted, the upper limbs are more rigid, and any attempt to passively flex them is attended with pain. The tongue is slightly furred. Pulse 132. Respirations 20, slightly irregular, and accompanied by slight twitchings of the limbs.

There is impairment of percussion note over the right back, and medium crepitations all over it. She complains of pain in the episternal notch when she coughs. There has been copious discharge from the left ear and slight from the right. The perforations of both drum membranes are healing up, that in the left being now only a narrow slit." The temperature was 102·4° at noon, 103·2° at four and eight p.m. There were six loose motions to-day. Her net weight was now 37½lb., showing a gain of 1½ lb. during the six days since she was removed from the tank. She was again placed in the tank this evening at a temperature of 95° Fah. Her temperature at midnight was 103·6° in the rectum.

Twenty-fifth day. She slept well all the night, and is looking very well this morning, being very intelligent, and expresses herself as feeling well. Her temperature at 8 a.m. 101·2°, the tank being 95°. It is now directed to keep the tank at 90° during the day and 95° at night. Her temperature to be taken in the rectum. Her attitude is still one of acute flexion, but the retraction of the head has disappeared. Pulse 124. Respirations 24, tranquil; she did not cough much during the night, and there was only slight discharge from the ears. Only two motions to-day.

Twenty-sixth day. "This patient slept well all night; is very intelligent; cough less troublesome; lower limbs are distinctly less rigid, and the patellar reflexes can only be slightly elicited; no ankle clonus." The temperature was 103° at midnight, but sank to 99·6° at 8 a.m. It rose to 102° at 8 p.m. The mean temperature to-day was 100·9°. There has been no diarrhœa since she was placed in the tank, and only two motions to-day.

Twenty-seventh day. "The patient slept very well last night and coughed little, she says she feels well, and there is now no pain in the head. There has been no discharge from the ears. The limbs are rather more rigid than yesterday. There is no retraction of the head. Respirations 24, tranquil. Pulse 118. The temperature has fallen gradually since she was placed in the tank, and at 4 a.m. it was subnormal for the first

time for nine days." The mean temperature to-day was 100·3°. Only one motion. Powders to be given every four hours as hitherto, but Dover's powder to be increased to six grains.

Twenty-eighth day. The mean temperature up to 6 p.m. to-day was 100·3°. Only one motion. She was now taken out of the tank as it was required for the seventh case in this series. Net weight 38½ lb., showing a gain of 1 lb. during the four days in the tank. The temperature ran up quickly after she was taken out of the water, and at 3 p.m. was 103·2°. She is placed on a water-bed. Temperature now taken in the axilla.

Twenty-ninth day. She slept well last night, but is fretful and calls for her "Uncle John." Pupils normal; tongue clean and moist; pulse 132, moderately full, soft, and compressible. She moves her arms more freely, and there is less rigidity; the lower limbs are still acutely flexed and rigid. She takes her food, which consists of milk and peptonised gruel, very well. Her temperature ranged to-day from 102° to 103·6°, mean 102·7°. Two motions.

Thirtieth day. "She did not sleep well last night. Since she was taken out of the tank her temperature has been maintained mostly between 102° and 103°. Takes her food well. Complains of slight pain at the back of her head. No discharge from ears. Tongue quite clean and moist. Her arms are quite mobile, and though her lower limbs are still rather rigid, they can, with some force, be almost completely extended. No patellar reflex or ankle clonus can be elicited. Respirations 19, calm. Pulse 124." Mean temperature to-day 102·6°. Two motions. Ordered custard pudding to be added to her present dietary.

Thirty-first day. This patient passed a very restless night, notwithstanding 10 minims of chlorodyne. This morning she is sleepy, pupils contracted. Her temperature, though still high, shows signs of falling. The lower limbs cannot yet be completely extended passively, but she can voluntarily extend them to a considerable degree for the first time for the last

twelve days. Respirations 22. Pulse 124. Complains of slight pain in left ear; there is no discharge from either ear." Mean temperature to-day 102°. No motion.

Thirty-second day. She passed a good night, and is progressing favourably. Mean temperature 101·9°. One motion.

Thirty-third day. "Complains of pain at back of head; there is free movement of upper limbs. Bowels slightly confined. She was sick this morning after her bread and milk. Respirations 30. Pulse 142. Coughs slightly." Mean temperature to-day 101·9°.

Thirty-fourth day. "Slept well last night, and is rather drowsy to-day; uses her hands freely, and can move her legs to a certain extent. Tongue clean; pupils rather small. Respirations 25. Pulse 136, of fair volume and tension. She is tired of bread and milk, but drinks plain milk freely." Ordered potatoes and gravy, and two eggs. Mean temperature to-day 101°; weight 38½ lb. net. Powders stopped.

Thirty-fifth day. "Patient slept very well. She has a pustular eruption on the head. Pupils contracted. Tongue slightly furred. Lower limbs in same condition, gentle extension to be applied to them. Diarrhœa ceased for five days. Temperature subnormal this morning. Respirations 14. Pulse 100, of fair tension." The temperature ranged to-day between 97·2° and 101°; mean 99·2°. Three motions.

Thirty-sixth day. Temperature ranged to-day between 97·8° and 101°; mean 98·6°. Five loose motions. Powders resumed.

Thirty-seventh day. The elastic extension which was applied two days ago to the lower limbs has considerably extended them, but it is now producing a slight slough of the skin above the right ankle, and it is discontinued. The diarrhœa has ceased. She has taken her food better to-day than yesterday. Respirations 16. Pulse 88, of good tension. Temperature normal.

Thirty-eighth day. Patient slept well last night, and is taking her food well; the lower limbs are drawn up, they are not very rigid and she can extend them to a considerable extent. The patellar and plantar reflexes are active but there

is no ankle clonus. Mean temperature 100°. Three motions. Powders to be given every six in place of every four hours.

Thirty-ninth day. Slept well last night, feels well and is very hungry. Syringing of ears discontinued. Pulse 88, firm. Respiration calm, slight cough; mean temperature 99·5°.

Forty-second day. Slept very well and feels well, she can almost fully extend her lower limbs. The knee-jerk is rather active, no ankle clonus. She eats well and is very hungry; the sore over the sacrum looks healthy. Her net weight is 38½ lb. having remained constant for the past fortnight.

Forty-fifth day (October 22nd). She was placed on ordinary hospital diet, and two pints of milk. On October 25th her net weight was 40¼ lb. From this time the progress was uninterrupted.

November 1st, weight 40½ lb., November 8th, 42 lb., November 15th, 45 lb. She is now quite well. November 23rd, net weight 46¾ lb. Discharged quite well.

CASE 6. *Typhoid Fever; Bronchitis; Immersed in the tank for six days; Cure.*

Sophia H., aged 16, was admitted to hospital on September 23rd, 1889. She says her illness began on September 8th, with dizziness and pain in the head, and she has kept to her bed since then. The headache abated after the first week, and three days ago she began to be troubled with cough. There has been no diarrhœa. She is apathetic, but quite intelligent. Lips dry and cracked; tongue very dry, brown, glazed, and fissured in the centre, moist with creamy fur along sides, red and dry at tip Lower lip trembles. Pulse 126, weak and dicrotic. Heart sounds dull. Loud dry rhonchus over the whole front of chest; over the lower lobes, the percussion is impaired, breathing feeble, and expiration prolonged. Splenic dulness measures four by four inches. Abdomen is not distended nor tender except in the right iliac fossa; no gurgling. Numerous lenticular rose spots on the chest, abdomen, and back. Hepatic dulness rather large, extending one inch below the

margin of the ribs. Temperature on admission 102·4°, extremities cold and finger-tips very livid; pupils normal.

Says that she slept well until last night, when she was kept awake by her cough. The medical man who sent her into hospital reports that for the past four or five days the temperature has been 103° Fah., varying three or four points between morning and evening. When he first saw her on September 13th, the morning temperature was 102.° Placed on six pints of milk, and ordered four grains of calomel.

24th (seventeenth day). Patient passed a good night; cough still very troublesome but almost no expectoration. She vomited a little bilious matter this morning. Bowels have not been moved since admission. Pulse 120, soft, very compressible and hyperdicrotic. Temperature ranged between 99·4° and 103·8°, mean 102·6°.

25th. Tongue very dry, cracked, and almost black in the centre; breath very foul; slept well; complains greatly of pain behind the sternum when she coughs; no expectoration. Pulse 112 to 120. Temperature ranged from 100·2° to 103°, mean 101·9°. She was placed in the tank at nine p.m., temperature of water 98° Fah. Her net weight was at this time 97 lb. (This patient was in the tank between the two periods that the preceding case was immersed). She was ordered a cough mixture, and a dose of castor oil.

26th. She did not sleep very well last night owing to the novelty of her situation, but feels much better to-day. Her tongue is still rather dry, but no longer black, and is now only slightly furred. Cough not so painful. Pupils normal; respirations 28, quiet. Pulse 104, of fair volume and tension. Temperature ranged from 99·6° to 102·6°, mean 101·1°. Tank lowered to 93°

27th. Patient is much improved, tongue clean and moist, but transverse fissures well marked. Pupils normal. Cough is much less. Respirations 20, quiet. Pulse 108, very compressible. First cardiac sound, dull. Average temperature 99·3°. Free motion, first since admission.

28th. Patient looks, and feels well. Pulse 108, fair

tension. Her temperature fell to 97° at four p.m. The temperature of the tank was then raised from 93° to 98°, and her temperature soon rose, reaching 102·8° at eight p.m., and continued at that till midnight. The tank was lowered to 95° at ten p.m., and by four a.m. her temperature was 98°. Tank to be kept at 95°.

30th. Average temperature to-day was 99·8°. Two loose motions. Ordered peptonised milk and bread.

October 2nd. She was removed from the tank yesterday evening, after having spent six days in it, during which time she lost 5½ lb., her net weight being now 92 lb. Respirations 19, quiet, slight cough. Pulse 136, of fair tension. The patellar-jerks are slightly exaggerated, and there is ankle clonus. Since her removal from the tank her temperature has maintained a higher level, the average to-day being 101.4°.

3rd. Pulse 128. Respirations 20. Mean temperature 99·4°. Bowels confined. Ordered, calomel four grains.

4th. Pulse 116. Respirations 20. Mean temperature 99·2°. Ordered one grain of calomel each evening.

10th. Ordered bread and beef tea. Urine normal.

14th. This patient is making rapid progress in convalesence. The patellar reflexes are still rather active, ankle clonus well marked, plantar reflex exaggerated.

18th. Net weight 98 lb.

22nd. Placed on ordinary diet.

23rd. Net weight 99 lb.

November 1st. 100 lb.

November 8th. 107 lb.

Discharged, November 14th, quite well.

CASE 7. *Dysentery of eight months duration; Typhoid Fever; Immersed in the tank for Thirty-one days; Cure.*

George McN., aged 28, steward, was admitted to hospital on September 9th, 1889. This is a fairly well-developed man of medium height, weight 127 lb., with light clothing. For the last eight months he has suffered from dysentery contracted in the Brazils. The motions are watery and slimy, and often

contain blood. Bowels are sometimes moved as often as thirty times a day. At other times when taking chlorodyne he may have only five or six motions. There is great pain and straining at stool. Constant borborygmi. He has been taking ordinary diet. His tongue is large, flatly indented at the edges, tremulous, and coated with a brown fur. Pulse 80, full and tense. No tenderness over abdomen. He feels weak, sleeps badly, and has no apetite. Temperature normal. He was placed on milk and arrowroot. Ordered ten grains each of compound ipecacuanha powder, and ipecacuanha powder, with a drachm of the syrup of red gum every four hours. On the 13th, the following powders were substituted: twenty grains of aromatic chalk and opium powder, and five grains of ipecacuanha powder, one every four hours. On September 19th, he was placed on bread and milk, lime water, two eggs, and arrowroot.

Notwithstanding treatment, he got rather worse, and had never less than twelve motions daily. Towards the end of September he got dispirited, and talked about leaving the hospital. His frame of mind was not improved by seeing another patient under my care, who was suffering more severely from dysentery than himself, rapidly improve under similar treatment. His weight on September 20th and 27th was 126 lb.

September 28th (nineteen days after admission). In the forenoon he had a rigor, he sweated all day, and in the evening his temperature was 104° Fah. He complained of headache and pain in the præcordium.

29th. Liver considerably enlarged, and there is much tenderness in the right half of the epigastric region. Bowels very loose; temperature, M. 101·8°; E. 104·6°. He is getting into a very anxious, nervous condition, and is affected with general tremor,

October 1st. The headache is less severe, and there is less tenderness in the epigastrium. There is gurgling and tenderness in the right iliac fossa, and over the trunk are a few elevated, rose-coloured, spots, disappearing on pressure.

Tongue thickly coated with a white fur. Pulse 108, large and very compressible. Temperature, M. 101·4° ; E. 104·2 ; he got 10 grains of antipyrin. His gums are becoming rather tender, which is ascribed to the deprivation of fresh vegetables, and he is ordered a tablespoonful of lime juice, together with 2 grains of quinine, and 30 grains of aromatic chalk, four times a day. Leiter's tubes applied to the abdomen.

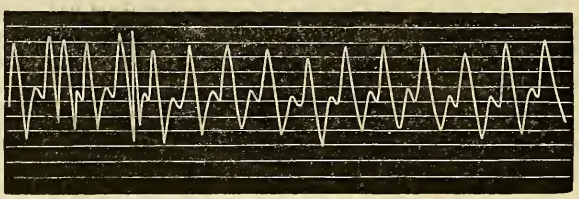
2nd. Temperature, 8 a.m. 102° ; 4 p.m. 103·6° ; 8 p.m. 104°.

4th. There is a copious elevated rose rash disappearing on pressure. The pain in the right iliac fossa was very intense last night. Notwithstanding the Leiter's tubes his temperature for the last two days has ranged between 103·4° and 104°. Patellar reflexes exaggerated, marked ankle clonus,

5th. This patient lies in a listless attitude and pays little attention to his surroundings. He is sensible, complains of headache and pains in the limbs, both of which have somewhat abated during the last day or two. Very sleepless ; thirsty ; pupils normal. Tongue very tremulous, coated in the centre with a dry brown fur, the tip dry and rather denuded of its epithelium. His hands and limbs are very tremulous. Pulse 132, moderately large, soft, and to finger, markedly dicrotic. Skin hot and dry. Epigastric and cremasteric reflexes absent, and only slight responses elicited of plantar reflexes. Patellar reflex and ankle clonus very marked. Liver from fifth rib six inches downwards ; lower border three inches below xiphoid cartilage. Spleen six by four inches. Lungs resonant, breathing at upper part of right lung puerile ; at both bases a few fine crepitations at end of inspiration. Respirations 30. Temperature 103° to 104° ; net weight 115 lb. He was put into the tank at a temperature of 95° at 9 p.m.

October 6th. There was a fall of 2° in his temperature during the first twelve hours in the tank, but when taken out at 10 a.m. for two hours, it rose to its former level. He is back again in the tank at a temperature of 90°. Tongue less tremulous, brown and dry, but beginning to get moist. Respirations 26. Pulse 126, markedly hyperdicrotic. Ordered naphthaline grains six,

and aromatic chalk powder with opium, ten grains, every four hours.



G. McN., 6-10-89, Pulse 126, Pressure 3 ozs.

7th. Did not sleep very well. Feels better to-day. Tongue tremulous, brown fur, moist. Pulse 144. Respirations 34; no cough. The tank has been kept at 90°. Patient's temperature fell from 104° at noon yesterday to 100° at four p.m.; it has not since risen, and is nearly normal this morning. He was out of the tank from 9-30 to 11 a.m., and at noon his temperature was 102°, but by four p.m. it had fallen to 98·6°. Diarrhœa still profuse but slightly abated since he was put in the tank.

8th. Slept well last night, but muttered most of the time. Pupils normal. Pulse 146, firmer and smaller. Respirations 31. Mean temperature 99·5°

9th. He had a quiet night, but he muttered a little while he slept. To-day he says he feels very well. Tongue moist and much cleaner. Pupils slightly contracted. Respirations 31. Pulse 152, moderately full, very compressible. Diarrhœa less. Tank not so offensive. Mean temperature to-day 100·8°. Ordered one ounce of lime juice in half a pint of saccharated lime-water twice daily.

10th. This patient did not sleep at all last night, and shivered most of the time. This morning he says he feels very well. The tongue is pretty clean. Gums improved. Pupils normal. Respirations 33. Pulse 152, full and compressible. Face flushed. Reflexes still exaggerated. Mean temperature to-day 99·5°. Ordered, in addition to his other medicine, ten minims of tincture of belladonna every four hours.

11th. Slept pretty well last night. Feels better. Pupils rather wide. Respirations 36. Pulse 152 full, but compressible. Temperature, midnight 99°; 4 a.m. 99·8°; 8 a.m. 97·8°.

He was taken out of the tank at 9-30 a.m. on account of alterations in the ward, so as to convert it into a tank-room, and not replaced till 7-30 p.m. His temperature at noon 100·4°; at 4 p.m. 102·6°; at 8 p.m. 102°, and at midnight 98·6°. The temperature of the tank was now raised to 93°.

12th. He did not sleep much last night, but was quiet and comfortable. When out of the tank yesterday he was hot, perspired freely, and was very pleased to return to the water again. His tongue is rather brown and dry, and also his throat, probably from the effects of the belladonna. He takes his food well. The diarrhœa is considerably less. Respirations 30. Pulse 120, full and of good tension. Mean temperature 98·3.° Tank raised to 95°. Urine normal. Placed on nine pints of milk.

14th. Respirations 21. Pulse 124. Diarrhœa diminished. Mean temperature for two days 99·2°. Belladonna stopped.

16th. He was out of the tank yesterday from 8 a.m. to 7 p.m. during which time his temperature rose from 97·4° to 100·8°. It had fallen by midnight to 98·2°. He was taken out of the tank to-day at 10-30 a.m. and replaced in it at 7. p.m. During this time his temperature rose from 97·4° to 99·8°, and fell at midnight to 98·2°. During the rest of his sojourn in the tank his temperature remained normal, so there will be no necessity to make further reference to it.

18th. Patient slept very well last night, and feels well to-day. Tongue clean but still tremulous, appetite good, pupils normal. Patellar reflexes exaggerated, moderate ankle clonus. Plantar and cremasteric reflexes normal. The whole body is covered to-day with a red papular rash, disappearing entirely on pressure, this is probably due to common salt and muriatic acid which have been added to the tank to increase the antiseptic action of the usual pound of boric acid. All medicine stopped, except lime juice. At this time it became necessary to see that the tank water was thoroughly aseptic, as my surgical colleagues were afraid that I was going to convert this Institution into a fever hospital. This apprehension was considerably intensified by a report that one of our nurses, who

had gone away on her holidays, was suffering from typhoid fever. The nurse returned to the hospital, and I found she was only suffering from febricula, which passed away in a few days.

On October 19th and 20th, I had the tank water converted into a solution of the perchloride of mercury, 1 in 2,000, which, owing to the interchange of water, was reduced, at the end of each day, to 1 in 3,000 or less. Dr. Logan, who kindly tried some cultivations of bacilli for me, found that this rendered the fæces antiseptic, but by the end of the second day we found that it was beginning to sterilize the patient. His gums began to get red and spongy, there was slight ulceration around the teeth and on the inner surface of both lips opposite the canines. The mercury was of course stopped The patient feels very well, the diarrhœa has almost ceased, the motions being reduced to two or three in a day.

October 25th. The motions were more formed yesterday than the day before, but to-day are not so well formed. Slept well and feels well; gums and lips improving. He was put on a mixture of iodide of potassium.

October 29th. The motions are reduced to two daily but are not yet formed. Papular rash improving. Gums slightly improved. The patellar reflexes are still exaggerated, ankle clonus well marked, left plantar reflex normal, right nearly absent.

November 1st. Net weight 95 lb.

November 5th. He was taken out of the tank to-day, having been immersed for thirty-one days. Net weight, $98\frac{3}{4}$ lb.

November 10th. Net weight, $104\frac{1}{2}$ lb.

November 16th. He is now quite better of the typhoid, but is still very weak. There was a slight return of the dysenteric diarrhœa after his removal from the tank, but it is now controlled by ipecacuanha.

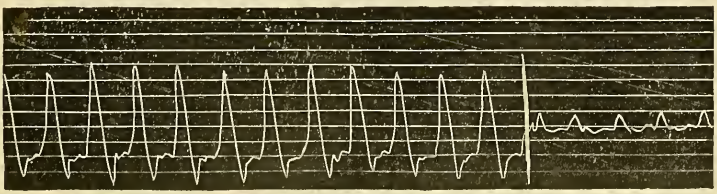
January 4th, 1890. He was discharged to-day, quite strong and healthy, except that his bowels are rather loose. Net weight, $116\frac{3}{4}$ lb.

February 5th, 1890. He returned to the hospital to-day, as

he was not keeping very strong, and his bowels were loose, three or four motions daily. He remained in the hospital to the 13th, and was then sent to the Convalescent Institution at Woolton for two weeks.

April 23rd, 1890. He was re-admitted to-day, suffering from a recurrence of the diarrhœa. Since he left hospital he has had an insufficient supply of food, and what he got was of a very rough character. He has fallen from 116¾ lb. to 107 lb. in weight. He was now placed on hospital diet, with chicken, two eggs, and two pints of milk. ℞ Pulvis Ipecacuanhæ, grains x, Pulvis Ipecacuanhæ Compositæ, grains x, Naphthaline, grains iv, Fiat pulvis. Mitte tales duodecim. Sig: one every four hours. On the 27th, there were substituted for these powders others composed of Dover's powder and aromatic chalk.

June 2nd. He progressed favourably until the 31st ult., when his temperature ran up without any assignable cause. Pulse rapid and dicrotic. He was red and flushed about the face and chest, but there was no distinct rash; his throat was red and congested but no ulceration, nor any appearance which could account for the high temperature. He has been taking half-a-drachm of the sulphocarbolate of soda every three hours, and has been on milk diet since the 31st. There was slight diarrhœa yesterday morning and he was ordered a repetition of his opium and chalk powders which stopped the diarrhœa; but the temperature ran up in the evening to 105°; this morning it was 100·2°. Yesterday afternoon his face began to swell, and there is now well marked acute local œdema of the nose and cheeks, of a distinctly erysipelatous character. Pulse 108, soft, full and compressible; the diarrhœa has lessened.



G. McN., 31-5-90, Pulse 108, Pressure 3 and 6 ozs.

June 9th. This patient's temperature kept constantly febrile with marked evening exacerbations up to the 7th instant. His whole face and scalp were then much swollen, red and tender, and I ordered Leiter's tubing to be applied to the head. It was kept applied from 6-30 p.m. to 11-30 a.m. yesterday when his temperature had fallen to normal. To-day the swelling has almost disappeared, and there is no tenderness except in the nose, which is still rather red and inflamed. The diarrhœa has also abated. Pulse 92, soft, full and regular. From this time he steadily improved, and he was discharged in good condition on July 21st, 1890. His net weight was 112 lb. Since then he has reported himself many times at the hospital and has kept quite well and fit for work.

CASE 8. *Severe Case of Typhoid Fever; Immersed in the tank for ten days; Cure.*

Mary Ann P., aged 21 years, housewife, admitted to hospital Nov. 4th, 1889, on the ninth day of the disease. On October 27th she took to bed on account of pain in the back, and headache which have continued more or less since, but are now abating. On October 30th she first felt pain in the right side of the abdomen, and for the last few days has suffered from diarrhœa.

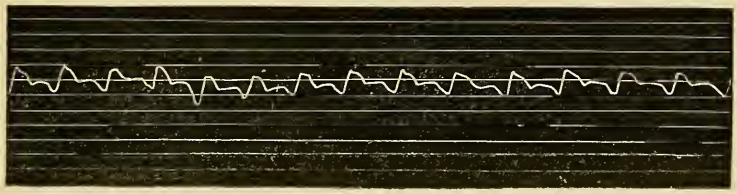
The patient now looks very ill, and lies in a very apathetic condition, answering questions slowly and with reluctance. The pupils are about normal size, the eyes look dull and have dark rings around them. Pulse 112, small and compressible. Respirations 26, tranquil. Tongue furred, dry in the centre, and tremulous. Sordes on teeth, and lips dry. Motions loose, dark brown, and very offensive. She was rather collapsed on admission but in the evening the temperature ran up to 104° F. There is tenderness in the right lumbar, upper part of umbilical, and left iliac regions, but not in the right iliac fossa although there is slight gurgling felt there occasionally. Over the body are about a score of elevated rose-coloured spots disappearing on pressure. The patellar reflexes are present but not increased; there is slight ankle clonus on both limbs, and

the plantar reflexes are much exaggerated. No response from umbilical or epigastric reflexes. There is slight cough, and harsh breathing, but otherwise lungs healthy.

Tenth day (November 5th). Her menses began to-day. The temperature this morning was 101·4°, but in the evening it reached 104·8°. She was then placed in the tank at a temperature of 95°. Net weight 127½ lb. She receives four pints of milk and peptonised gruel. Naphthaline six grains every four hours.

Eleventh day (November 6th). She passed a very comfortable night and her temperature steadily fell from 104·8° when placed in the tank to 100° at 8 this morning. Her tongue is now moist, eyes brighter, and the headache has disappeared. Pulse 92, much firmer. Respirations 22. Temperature in the evening reached 103·2°.

Twelfth day (November 7th). Patient comfortable but did not sleep well. Tongue moist and furred; pupils slightly dilated; appetite good. Pulse 100, of fair tension (see tracing). Respirations 22; cough not troublesome. The temperature yesterday from 4 p.m. to midnight kept about 103°, but this morning it has fallen to 100°. The temperature of the tank was 95°, but it is now reduced to 90°, and in this evening's exacerbation her temperature only reached 102·2° at 8 p.m., and then quickly declined.



M. A. P., 7-11-89, Pulse 100, Pressure 2 ozs.

Fourteenth day (November 9th). Menses ceased to-day. The maximum temperature yesterday was 103°, and occurred at 4 p.m. This morning it was 100·6°, and in the evening it only reached 102°.

Sixteenth day (November 11th). The morning temperature yesterday was 99°, and to-day 98°. Each evening it reached 102°.

Tongue moist and furred, but not tremulous. Pulse 104, moderate tension. Cough easier, slight sore throat.

Eighteenth day (November 13th). Sore throat well; cough nearly gone; patient fells well; motions formed. Pulse 108. The morning temperatures are now about normal, and there is an evening exacerbation of about 2 degrees.

Twentieth day (November 15th). Her temperature yesterday evening was 100°, and since then it has been normal. She was taken out of the tank this afternoon. Her net weight is now 117½ lb., showing a loss of 10 lb. during the ten days immersion.

November 19th. Temperature has been normal since last note. Tongue almost clean; pupils normal; slight ankle clonus on both sides; pulse 96, soft.

November 23rd. Net weight 123 lb. Ordered one egg daily. She is still on milk and farinaceous diet.

November 25th. Ordinary hospital diet.

November 28th. Net weight 127 lb.

December 5th. Discharged quite well.

CASE 9. *Very severe case of Typhoid Fever; Bronchitis; Hæmorrhage from bowels; Monoplegia of left forearm; Twenty-six days in the tank; Cure.*

Helen D., aged 12, admitted to hospital November 13th, 1889. Patient took to bed on October 27th, complaining of headache, and feeling ill. She was up on the 28th and 29th, but felt sick and hot; since that time she has been confined to bed. On November 1st, she received a worm powder which was followed by diarrhœa for three days, and she passed a round worm; subsequently her bowels have been moved once or twice a day. She has been troubled with a slight cough for about a week.

Present condition. Face flushed, eyes bright, pupils widely dilated, lips dry and ragged; tongue covered with a thick white fur, moist, and tremulous; appetite poor; bowels regular. There is no abdominal tenderness or gurgling in right iliac fossa. There is one red spot on lower part of sternum, which disappears on pressure, but is not very characteristic. No other spots.

All over the back of the chest there are rhonchi and bubbling râles with the addition of some fine crepitations at the left base. The heart's action is very rapid, 144 per minute. The patellar reflexes are not exaggerated, but there is slight ankle clonus, and active plantar reflexes.

Splenic dulness large, measuring $3\frac{3}{4}$ by $3\frac{1}{4}$ inches. Her temperature as recorded twice daily by the District Nurse during the past 8 days has usually ranged between 102° and 103°, but last night it reached 103·8°. On admission she was rather collapsed, and her temperature was 101°, but at 8 p.m. on that evening immediately before she was placed in the tank it had mounted to 104·4° F., the temperature of the tank water was 95°. Her net weight was $52\frac{1}{4}$ lb. Diet: 4 pints of milk and peptonised gruel. 3 grains of naphthaline every 4 hours.

November 14th (eighteenth day). This morning the patient says she feels better. The flush has disappeared from her cheeks; the pupils are not so widely dilated. Her temperature fell to 101·2° at midnight, and this morning it is 102·2°, and during the day it remained at the same level. Respirations 30. Pulse 138, much firmer than it was last evening. No motion to-day.

November 15th. Patient says she feels better to-day. The bowels acted this morning, and the motions were very loose and offensive. The temperature of the tank was allowed to fall during the night, and at 4 a.m. her temperature was 98·2°, the patient, however, says that she was quite comfortable, and she slept well during the night. Pupils less dilated. Tongue clean but rather dry. Respirations 32, very little cough. Pulse 140. About 2 p.m. her temperature fell to 97·2°, she was then very cold and blue about the face. She was taken out of the tank, and with the application of hot bottles and a dose of brandy, she soon recovered. At 4 p.m. her temperature was 101°; at 4-30 p.m. she was replaced in the tank at 98°, and by 8 p.m. her temperature had fallen to normal. This morning she was ordered the following mixture in addition to the naphthaline; ℞. Tinct. Digitalis, ℥iii, Caffeinæ, gr. iss. Tinct. Belladonnæ ℥v. Aq. Menth. Pip. ad ℥i., four times a day.

November 16th. From midnight to 8 a.m. her temperature remained at 104·2°, but at 10 a.m. it had fallen to 102°. She looks rather pale, but says she feels comfortable. Tongue moist. Respirations more tranquil and less frequent; cough slight. Pulse 144, very feeble. Her temperature remained during the rest of the day at 101·4°. One motion to-day.

November 17th. The nurse took the patient out of the tank this morning at 5-30, as she thought her rather collapsed, but Dr. Wallace afterwards considered that as the patient's temperature remained high, the apparent collapse was merely the muscular tremor which has been frequently noticed in the tank. She was replaced in the tank at 1 p.m., her temperature having fallen from 103° to 100·6°. During the day she trembled a good deal, but was quite comfortable. Her temperature did not fall below 100°. She vomited twice to-day.

November 18th. Temperature, midnight, 102·2°; 4 a.m. 101°; 8 a.m., 104°; noon, 103·6°; 4 p.m., 101·8°; 8 p.m., 102·2°. Tongue clean and moist. There is general tremor of the muscles. Respirations tranquil, cough has disappeared. Pulse 148, fair tension. She refuses the gruel, but takes the milk readily; ordered boiled bread and milk.

November 19th (twenty-third day). Patient feels better this morning and looks it. Pupils moderately dilated. Tongue clean. The whole body trembles, although the tank is 92°, and her own temperature 100°. The pulse cannot be counted on account of the trembling. Heart beats 148, and forcible. There was a slight amount of blood in the motion to-day.

November 20th. At midnight her temperature fell to 97°, the tank being 95°. She was not collapsed, and on the tank being raised to 98°, her temperature rose to 100·8°. The nurse says she rambled slightly during the night, but she is now intelligent and says she feels better. Pupils dilated, cheeks and lips rather cold and livid. Tongue clean, but rather dry. She has a slight cough. Pulse 144, good tension. The muscular tremor is much less marked. No blood in motions to-day.

November 21st. Says she feels well; pupils dilated; tongue clean, rather dry. No more blood in motions. Pulse 144,

moderately strong. Slight cough. Lung percussion clear, slight rhonchus at base. Reflexes not exaggerated. Tenderness in right iliac fossa. Temperatures, midnight, 97·6° ; 4 a.m., 100°; 8 a.m., 99·6°; noon, 99·4°; 4 p.m., 97·8°; 8 p.m., 98·8.° The tank was kept at 95°, when patient's temperature was above normal, and at 98° when below normal.

November 22nd. This forenoon the motion was found to contain blood clot representing about 3 or 4 fluid ounces of blood. Patient says she feels well, but she is rather cold and livid about the cheeks. The trembling of the hands has returned. Pulse 152, tension not so good. Temperature, midnight, 98·4° ; 4 a.m., 98·6° ; 8 a.m., 100·4°; noon, 97.° She was then taken out of the tank till 3 p.m., and as her temperature was running rapidly up she was replaced. At 4 p.m. it was 101·8°, but at 8 p.m. had dropped to 98·2.° She was ordered 2 eggs daily, and 5 grains of gallic acid every 4 hours.

November 23rd. Patient feels comfortable ; pupils dilated ; eyes suffused ; cheeks rather cold and slightly livid ; tongue moist. She does not take her food well, and seems to have emaciated considerably since admission. Blood clot in stool to-day. Heart beats 148, sounds clear. Temperatures, midnight, 98·2° ; 4 a.m., 99° ; 8 a.m., 100·6° ; noon, 100·8° ; 4 p.m., 100·8° ; 8 p.m., 101°.

November 24th. Patient seems rather better. Bowels freely moved, but motions contain no blood. She is taking her food badly and was sick after her milk ; coughs a little. Pulse 148-156, rather feeble. Temperatures, 101·2°, 99·8°, 100·4°, 100·8°, 103·2° (when out of the tank for sanitary purposes), 100·4°. She was ordered 6 ozs. of champagne daily.

November 25th. Seems rather better to-day. Pupils slightly dilated. Pulse 164 ; temperatures 101°, 100°, 101·2°, 101·2°, 97·8°, 100·8°. ℞ Lac. Bismuthi, ʒi. Sodæ Bicarb., gr. v. Tinct. Belladonnæ ℥v. Syrupi Tolutani, ʒss. Aq. ad ʒii. Every four hours. Stop other medicine.

November 26th (thirtieth day). She takes her food better and has not been sick since she began the champagne. Pulse 152. Temperatures 98·4°, 100°, 97·6°, 99·4°, 100°, 98°.

November 30th. She looks well; tongue moist and slightly furred. She has taken her nourishment well for the last three days. Pulse 152. Temperature has varied between 99° and 100°.

December 2nd. Patient sleeps well and looks well: she takes her food well. The pulse is 140 (the lowest recorded for the last 10 days), good tension. Heart sounds clear. As her temperature shows a tendency to rise the tank is now reduced to 93°.

December 3rd. The patient has for some time lain with her thighs and legs flexed, and now they can be with difficulty straightened. Pulse 144. Temperature, 98° to 99·6°. Net weight 43 lb., showing a loss of $9\frac{1}{4}$ lb. in 20 days.

December 5th (thirty-eighth day). Feels well and takes her food well. Pulse 136; heart sounds clear. Temperature normal. Beef tea one pint, raw meat 8 ounces. Stop champagne.

December 6th. Temperature has not been above 99° for two days. Tongue clean and moist. Takes food well. Legs stiff, tender, and covered with a papular rash. Motion formed.

December 7th. Patient is very well and bright to-day. Tongue clean, takes food well. Pulse 136. Temperature 98° to 99·4°.

December 9th (forty-second day). Heart beats 112, strong, and sounds clear. Temperature normal. She was taken out of the tank at 4-30 p.m., having been immersed twenty-six days. Her net weight is now $41\frac{1}{2}$ lb., showing a loss of $10\frac{3}{4}$ lb. during the 26 days.

December 10th. Patient cries very much about her lower limbs which are acutely flexed and painful; any attempt to straighten them causes her much suffering. The skin is covered with a red papular rash from the effects of the tank water. She did not sleep well last night, and is not taking her food so well. Patellar reflexes active, slight ankle clonus on left side. Pulse 124, moderately strong. Temperature this evening 100·6°.

December 12th. She has been out of the tank for three days, and the temperature which at first ran up a little is now

nearly normal. The lower limbs are not so painful and can be further extended. There is wrist drop on the left side. Pupils almost normal. Tongue pretty clean. Bowels confined. Appetite very good. Patellar reflexes present, no ankle clonus.

December 20th. Temperature has been normal, and the general condition of the patient is improving, but her net weight is now only 40½ lb. The paralysis of the extensor muscles of left hand is getting better under the influence of massage and electricity. Placed on ordinary diet, and 3 pints of milk.

December 28th. Net weight 42¼ lb.

January 3rd, 1890. Net weight 45 lb.

January 7th. The patient is getting fat and rosy, eats and sleeps well, and sits up most of the day. When the extensors of the fingers of left hand began to resume power the hand assumed the position of *main en griffe*, showing paralysis of the lumbricales. These as well as the extensors have now greatly recovered their power, and are getting rapidly well.

January 10th. Net weight 48 lb.

January 15th. She was discharged to-day in every respect quite well and strong.

CASE 10. *Typhoid Fever; Anæmia; Pleurisy; Thirteen days in the tank; Cure.*

Harriet J., age 22, admitted November 15th, 1889. Her present illness began on November 4th, with severe headache, pains in the back and limbs, sore throat, and anorexia. On the 7th diarrhœa began and has since persisted.

Present condition. She is slightly flushed: pupils dilated: tongue clean but red and dry in centre: she is very anæmic, lethargic, and apathetic. Motions loose and offensive. Temperature 102°-103°. Net weight 95¼ lb. Ordered naphthaline grains 6 every 4 hours: milk diet and peptonised gruel. Put into the tank at a temperature of 95°.

November 18th (fifteenth day). She feels better: tongue moist; pulse 112, fair tension. Temperature 100°-102°.

November 19th. Patient feels and looks better. Tongue clean, but tremulous; face rather flushed; pupils dilated; slight

cough; pulse 120. At the bases of both lungs the percussion is impaired, and there are crepitant and sibilant râles. No patellar reflex or ankle clonus can be elicited; no rose spots. Temperature 99·8° to 102°. Urine acid, sp. gr. 1027, no albumen.

November 21st. Temperature this morning rose to 102·4°. The tank was reduced to 93°, and patient's temperature gradually fell to 98·8° at 4 p.m., rising to 100·6° at 8 p.m.

November 23rd. Patient feels well, and takes her food freely. There is one distinct typhoid spot found to-day.

November 28th (twenty-fifth day). This case has progressed very favourably, and she is taken out of the tank to-day. There have been daily fluctuations of temperature of two degrees with a prolonged remission each day to normal. It has been normal for two days. There are now increased patellar reflexes, and ankle clonus. Net weight 89½ lb., showing a loss of 5¾ lb. in 13 days.

December 5th. ℞. Mist. Ferri Co., fl. ʒxii. Decoct. Aloes Co., fl. ʒviii. Sig. ʒii., thrice daily after meals.

December 9th. Net weight 94 lb.

December 11th. Ordinary diet. She has greatly improved, but is still weak. The patellar reflexes are normal, and the ankle clonus has disappeared.

December 28th. Net weight 102¾ lb.

January 3rd, 1890. Net weight 107¼ lb.

January 7th. She was out yesterday, got wet, and at 8 p.m. she had a rigor; her temperature ran up to 102·4°, and she complained of severe pleuritic pain in left side. Under the influence of fomentations and a diaphoretic mixture this soon subsided, and in a couple of days she was practically well again. Her menses began on January 10th, and ceased on the 13th.

January 17th. Net weight 108 lb.

January 23rd. Dischargd to-day, quite well and strong.

CASE 11. *Typhoid Fever; Eleven days in the tank; Cure.*

Bridget W., aged 17, admitted to hospital December 4th, 1889. Patient became ill on November 16th, with sickness and headache. She took to bed on the 18th, and has been confined

there since. She has had diarrhœa since the commencement of the illness, and for the past two weeks has had pain in right side of the abdomen.

Present condition. Pupils dilated; breathes rapidly and heavily; respirations 34; eyes suffused; lips dry and cracked; sordes on teeth; tongue red and glazed. She is very stupid, and it is with great difficulty that she can be roused to answer questions. There is gurgling, but no tenderness in right iliac fossa. There are about a score of elevated rose-coloured spots which disappear on pressure. The motions are loose, yellow, and offensive. There are a few rhonchi in both lungs. Pulse 124, soft and full; temperature 104°. The patellar reflexes cannot be elicited; there is slight ankle clonus, but most marked on the left side. Urine acid, sp. gr. 1015, a trace of albumen. Milk and peptonised gruel. Naphthaline grains 6 every 4 hours.

December 5th. Her temperature fell to 100° this morning, but in the afternoon it rose to 103°. She was placed in the tank at 95°. Net weight 93 lb.

December 6th (twenty-first day). Patient is not nearly so stupid and says she feels much better. Pupils moderately dilated; tongue getting moist at the edges; sleeps well; and takes her food well. Respirations 29; pulse 124, soft; temperature 99·4° to 102°.

December 7th. She does not feel so well to-day, rambled a good deal during the night, and the nurse had some difficulty in keeping her in the tank. Takes her milk well. Tongue dry. Pulse 120, rather firmer. The first sound of heart is dull. No knee-jerks, but slight contractions of the right vastus externus can be elicited on percussing the outer border of the corresponding patellar tendon.

December 8th. Tongue moist; pulse 140; face flushed; pupils dilated.

December 9th. Patient very fretful, and craves greatly for beer, and promises to take her gruel as her taste is now gratified by one pint of beer daily. Tongue very dirty, but quite moist. Respirations 22. Pulse 124, soft and feeble. Her

temperature averaged to-day 99·7°. She was taken out of the tank at 6 p.m. Net weight 91¼ lb.

December 10th. Her temperature this morning has ranged from 100·6° to 101·4°. Tongue dirty and becoming dry in centre. Pulse 124, very compressible. Says she feels worse, and she does not take her food so well. There is considerable diarrhœa. At 4 p.m. her temperature reached 102·4°. She was replaced in the tank at 5 p.m., and by 8 p.m. her temperature had fallen to 99·4°. Boiled bread and milk.

December 11th. She slept well. Pulse 112, much firmer. Tank reduced to 93°, after which her temperature fell from 101° to 99°, rising at 8 p.m. to 100°.

December 12th. She slept well; pupils normal; pulse 112; diarrhœa less; mean temperature 98·4°.

December 13th. Patient looks bright; tongue cleaner; takes food better; smiles frequently; and complains of the "cowld wather." Pulse 96. Mean temperature 98·6°.

December 16th. Taken out of the tank to-day at 11 a.m., the temperature having been subnormal for 3 days. Her net weight the following day was 85 lb.

December 19th. She has been three days out of the tank, and feels very well. Temperature normal; pulse 84; pupils still dilated; tongue furred with a slight tendency to dryness; takes food well; bowels rather confined. There is well marked clonus, especially on the left side.

December 28th. Net weight 84½ lb.

January 2nd, 1890. Two eggs and milk diet.

January 3rd. Net weight 89½ lb.

January 10th. Net weight 98 lb.

January 15th. Ordinary diet.

January 18th. Net weight 106 lb.

January 28th. Discharged well and strong.

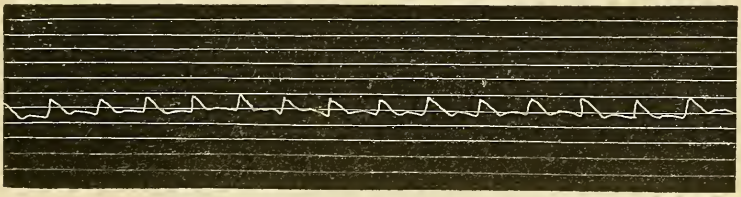
CASE 12. *Typhoid Fever; Sixteen days in the tank; Cure.*

Edward R., aged 10 years, admitted to hospital February 10th, 1890. Present illness began on February 2nd, with headache and sickness; and afterwards pain in right iliac region.

There has been diarrhœa from the commencement, and a cough for the last three days.

February 11th. The patient is a well-nourished boy with flushed face. Pupils moderately dilated; lips dry and coated with sordes; tongue tremulous, its sides are coated with a thick white fur with the large papillæ showing through, it is dry and brown in the centre. Heart normal, except that the first sound is dull. The percussion over the upper lobe of the left lung is impaired, and there is occasionally a fine crepitant râle at the end of inspiration, but no tubular breathing. There are rhonchi all over the chest. Respirations 36. Pulse 108. There is gurgling and tenderness in the right iliac fossa, but the abdomen is not much distended. There are a few elevated lenticular rose spots which disappear on pressure. Knee-jerks rather active, slight ankle clonus, plantar reflexes exaggerated. Temperature has ranged from 101·8° to 103·6° since admission. Ordered 6 pints of milk daily, and 3 grains of naphthaline every four hours.

February 12th (eleventh day). Temperature this morning 102·8°. He was placed in the tank at 2 p.m.: temperature of water 95°.



E. R., 12-2-90, Pulse 108, Pressure 2 ozs.

February 13th. Patient slept well last night, and finds the tank very comfortable. He has now no cough, the lung percussion is clearer, and the crepitations are less numerous. Pupils normal; tongue furred, but moist; cheeks and lips rather cold and livid. His temperature remained about 103° during the night, but at noon it had fallen to 101·4°, and at 4 p.m. had further decreased to 100°. He takes his food very well; diarrhœa moderate. Net weight 50 lb.

February 14th. Patient slept well. Pulse 100, stronger.

There are a few fresh rose spots on back. Temperature maintained at a lower level, ranging from 100° to 102°.

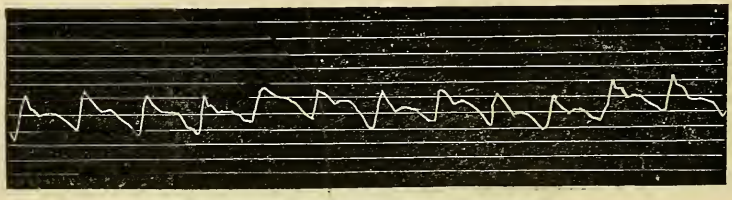
February 15th. Patient did not sleep so well last night, and is beginning to be fretful. He takes his milk well. His temperature is gradually declining, cheeks flushed and hot. Pupils normal. Tongue moist, and cleaning at the edges. The pulse and respirations are somewhat increased in frequency. Ordered malted milk.

February 17th. Patient sleeps well and takes his food well, but is fretful and complains of pain in palms of hands and in sole of right foot. The temperature has been steadily declining, and this morning it sank to 98°. Pulse 116, tension improved. Respirations 24.

February 19th. Slept well last night, and says he feels better. Pulse 96, good tension. He feels hungry, and is now ordered boiled bread and milk.

February 21st. Slept well. Pulse 96. Temperature normal, but in the evening it ran up to 101·2°.

February 24th. Temperature is now practically normal. Pulse 92, good tension and fair strength and volume. Net weight 48 lb.



E. R., 24-2-90, Pulse 92, Pressure 2 ozs.

February 28th. His temperature has been about normal for past week. He feels very well. Pulse 96. Net weight 47 lb. Taken out of the tank at 5-30 p.m., after sixteen days immersion.

March 10th. Three days ago there was a rise in the temperature owing to constipation, but since he had 2 grains of calomel it has returned to normal. Ordered 2 eggs daily.

March 11th. Net weight 51 lb.

March 24th. Net weight 52 lb.

March 25th. Placed on ordinary hospital diet, and 2 pints of milk.

April 14th. Net weight 66 lb.

April 17th. Discharged quite well, fat, and rosy.

CASE 13. *Severe case of Typhoid Fever; Hypostatic Congestion of Lungs; Bronchitis; Numerous Boils and Abscesses; Relapse; Debility with Anæmia; Immersed in the tank for twenty-seven days; Cure.*

Edward McK., aged 23, labourer, admitted to hospital, March 17th, 1890. He was in good health till the 6th instant, when he says he got wet going home from work. He felt pains all over his body, and has since been confined to bed. He has had diarrhœa from the commencement, and on the 8th and 9th he suffered from epistaxis; on the 10th, he began to suffer from cough, which has since continued.

Present condition. He complains of severe headache, pains in his legs and abdomen. He is rather stupid, but answers questions intelligently. Face flushed, skin hot and dry; pupils dilated; tongue dry, coated with a white fur at edges, brown, and transversely fissured in centre. Breathing rapid and laboured; respirations 36; cough troublesome, mucous expectoration, streaked with bright red blood. Pulse 104 soft. Patellar reflexes exaggerated. There are a few rose spots. Splenic and hepatic dulness enlarged. Tenderness in right iliac fossa. Over the front of lungs percussion clear, but there are mucous râles; the percussion is impaired over the posterior aspect of both lungs, and over the right back it is almost absolutely dull. Crepitating râles over whole back, but most numerous over right side, and here the vocal fremitus and resonance are increased. Motions loose and offensive. Temperature, 4 p.m., 103·6°; 8 p.m., 104·4°; 12 p.m., 104°. After 10 grains of antipyrin it then fell to 102°. Ordered four pints of milk and arrowroot, 2 grains of calomel.

March 18th (twelfth day). He passed a very restless night, moaning nearly all the time, and complaining of severe pain all over his body. He rambled during the night, and is now

very despondent; says he is going to die. He is thirsty; tongue dry and fissured; cough troublesome; sputum consists of dirty brownish mucus, tinged with blood. Urine and fæces passed unconsciously. Motions loose, dark greenish colour, alkaline reaction, and very offensive. Heart's action feeble, sounds dull. Pulse 116, soft and weak. Lung phenomena as noted yesterday. Temperature reached 104·4° at noon. He was placed in the tank at 4-30 p.m.; temperature of water 90°. Net weight 167 lb.

March 19th. Patient's temperature sank at midnight to 97·4°. The tank was then raised to 98°. and at 1 a.m. his temperature was 98·8°. The patient was very delirious, and at 2-30 a.m. got out of the tank into a vacant bed. He was then very restless and with difficulty was kept in bed, Urine and fæces passed unconsciously. Motions very frequent, loose, and offensive. Pulse 120, small, soft, and weak. Respirations 32. Urine acid, sp. gr. 1015, no albumen. He remained out of the tank until my visit in the afternoon. His temperature at 4 p.m. 104°. Ordered 2 grains of calomel, and was replaced in the tank at 5-30 p.m.

March 20th. Passed a very restless night although he had 30 grains of sulphonal. During the last 24 hours he has had 13 loose motions of a light yellow colour, and alkaline reaction. Tongue cleaner and moister. Temperature steadily fell after he was put in the tank, and at 4 a.m. it was normal. At 8 a.m. it was 100·8°, and while the patient was out of the tank for sanitary purposes, from 9-30 a.m. to 1 p.m., it rapidly rose to 104·2°. It fell to 97·4° at 8 p.m., but when the temperature of the tank was raised it mounted to 101·6° at midnight.

March 21st. He had 30 grains of sulphonal, and 20 grains of bromide of potassium during the night, but he was very restless up to 3 o'clock, when he slept for half-an-hour. There is profuse diarrhœa. Pulse 118, small, and compressible; cough much easier. He takes his nourishment freely. At 4 a.m. his temperature fell to 96·4°, but at 8 a.m. it was normal, and when out of the tank, from 9-30 to noon, it reached

102·2°. During the rest of the day it fluctuated between 101·2° and 102·8°.

March 22nd. He was restless up to midnight. He then had 10 grains of Dover's powder and slept quietly till 4 a.m., only roused to take a drink at intervals. Temperature of tank 93°. He seems much better to-day. Cough less troublesome, Tongue cleaner. Pulse 112. Reflexes exaggerated.

March 23rd. He had 10 grains of Dover's powder last night, and slept well. Diarrhœa still continues, but motions are not quite so offensive, and are less liquid. Pulse 116. During last 24 hours he has had six pints of milk, and four rounds of bread soaked in milk. Temperature fluctuated to-day between 99·2° and 102°, and the rise during the time he was out of the tank was less marked.

March 24th. He had a very good night after 10 grains of Dover's powder. He appears much better, is now contented and hopeful. Tongue moist. Slight dulness at bases of both lungs, most marked on left side, there are many crepitating râles; anteriorly the breath sounds are normal, with the exception of a few fine râles on left side. Pulse 128 after examination. Ankle clonus and knee-jerks well marked. Eight motions since yesterday morning. ℞ Ammon. Carbonatis, grs. v. Caffeinæ, grs. ii. Aq. Chloroformi, ad. ℥ss. Every four hours.

March 25th. He had only 8 minims of laudanum last night and did not sleep so well, but this morning he says he feels "first rate." Tongue fairly moist and clean with the exception of two narrow bands of yellowish fur at the sides. Pulse 120, soft and feeble. Some very offensive motions. He was out of the tank to-day from 9·30 a.m. to 5 p.m. as one of the water pipes had burst. At 4 p.m. his temperature was 104°, but by midnight it had fallen to 100·6°.

March 26th. He had a good night. Motions are more formed and not so offensive. Cough not so troublesome. Tongue moist, yellowish fur at edges.

March 27th. Slept fairly well last night. Pulse 112. Cough still troublesome. There is now only one motion daily. Temperature shows less fluctuations, mean 101.5°.

March 28th. He had a good night. Pulse 116. Respirations 38. Cough seems to be much better. Breath sounds anteriorly are rough and accompanied by a few râles. Posteriorly breath sounds are rough and rasping; crepitant râles, prolonged expiration, and dull percussion at both bases. No abdominal pain or tenderness. Motions more formed and not very offensive. Knee-jerks exaggerated, ankle clonus present. Mean temperature to-day 100·9°.

March 29th. Slept well. Cough more troublesome, and expectoration more profuse. Lungs, anteriorly some crepitant râles, and harsh breathing; posteriorly dull percussion over both lower lobes, but most marked over left, over right there are numerous mucous râles, over left lung the breath sounds are louder and higher pitched than those on the right side, and expiration is markedly prolonged. Bowels not much moved since yesterday. Pulse 108. Temperature 100·4° to 101·6°, mean 100·9°.

March 30th. At 4 a.m. his temperature was 99·0°. At 4-45 a.m. he got out of the tank and was found by the nurse sitting on his locker, she put him to bed, and he was out of the tank till 8-30 a.m. At 8 a.m. his temperature was 102·8°. He now says that he had "the horrors," saw things in the air, and thought people were running after him. He is very sorry that he got out of the tank, and is glad to get back to it. Tongue moist. Pulse 120, small. Two motions, formed. Temperature steadily fell to 100·6° at 8 p.m. and 100·8° at midnight; pulse 108.

March 31st. Slept well. Cough troublesome, and expectoration more profuse. Lung phenomena much as last noted. When he was out of the tank this morning his temperature reached 102·4°, but otherwise it kept at a low level, the mean of six observations, including that when out of the tank, being 100·6°.

April 1st. Slept well. Tongue moist. Pulse 112, small, firm, and rather wiry. Cough still rather troublesome; over anterior aspect of chest breath sounds normal; over back, coarse crepitant râles, and dull percussion at both bases. Temperature to-day 97·8° to 100·8°, mean 99·7°

April 5th. He has progressed favourably since last note. His temperature has been almost normal, the mean of 18 observations being 99·2°. He has slept very well, and last night was the best which he has had. Tongue moist. Pulse 110. Cough much better. Bowels have not acted for 36 hours. Some dulness at base of right lung; breath sounds nearly normal, a few crepitant râles; in front breath sounds are rough, but otherwise normal. Knee-jerks and ankle clonus present.

April 8th. Slept very well last night. He had 2 grains of calomel yesterday and bowels acted freely. Cough much better. Tongue moist and clean. Pulse 100. For three days there have been greater fluctuations of temperature, and when out of the tank it ran up to about 102° each day.

April 9th. Ordered kolatina, boiled bread and milk. Add to each dose of mixture ℥i. of tincture of cinchona.

April 11th. His temperature ran up yesterday afternoon, and he wandered a good deal. He thought he saw men walking on the wall, and he imagined that there were rats in the tank. His bowels were freely moved in the evening; the motions were loose and very offensive. He passed a rather restless night, but this morning he says that he is all right. Cough very much better. Pulse 100. Tongue moist, and slightly furred. Temperature was subnormal the whole of to-day. Naphthaline grains vi., thrice daily.

April 12th. Sleeps well. Tongue moist. Pulse 96. Temperature about normal, mean 99·3°. Bowels not moved for two days.

April 14th. His temperature was normal to-day, and he was taken out of the tank at 5 p.m. His temperature afterwards ran up to 102° at midnight. Ordered fish diet.

April 15th. To-day his temperature reached 103·4° at 4 p.m. Pulse 132. Bowels confined. Net weight 150 lb. There are three abscesses in right gluteal region, which were opened to-day.

April 16th. His temperature was normal this morning, but rose to 100·6° in the afternoon. Three abscesses in the left

gluteal region opened to-day. He has perspired profusely since he was taken out of the tank. Ankle clonus marked; knee-jerks exaggerated. Contraction on tapping the supinator longus muscle in the forearm. For the mixture of March 24th, the following is substituted. ℞ Acid. Nitro-Mur. dil., ♏x. Tinct. Belladonnæ, ♏x. Tinct. Chinchonæ Co., ℥ss., Syrupi ℥i. Aq. Chloroformi, ad ℥i. Every four hours.

April 17th. Seems much better this morning, but still perspires freely. Temperature normal. Pulse 100. Tongue fairly clean. Bowels acted twice during the night; motions formed. Abscesses are looking well. Respiratory sounds normal. Placed on ordinary hospital diet, kolatina, and one pint of milk

April 28th. He progressed favourably until the 25th inst., when he began to complain of pain over the lower ribs on the left side, in the rigion of the spleen where there seems to be some fulness. Breath sounds are feeble on both sides, especially at base of left lung where the percussion is impaired. Tongue moist and furred. He does not care for his food and he is very dull and apathetic. Bowels moved this morning. The diaphragm is not acting well. Temperature last night 103°, this morning 99·2°. Poultices. ℞ Sodæ sulpho-carbolatis, ℥ss. caffeinæ, gr. ii. Syrupi, ℥i. Aq. Chloroformi, ad ℥i. Every four hours. Stop mixture of 16th.

April 30th. The pain has been much worse since 3 a.m., and there is now distinct bulging of the lower ribs on left side, and some tenderness on pressure just below the ribs.

May 8th. His temperature has been normal since the 1st inst., and he now feels well and free from pain. Tongue clean. Pulse 84. Ordered 2 eggs daily.

May 9th. He is doing well, ordered to revert to mixture of April 16th.

May 16th. Since the 12th, there has been continuous febrile movement with marked evening exacerbation, and this evening it reached 103·8°. Pulse 116, soft, full and dicrotic. Respirations 34. He complains of headache, and a dull aching pain in left side over lower six ribs. Tongue coated with white fur; no appetite.

He is very thirsty; the diarrhœa has returned, motions bright yellow and offensive. Heart sounds feeble, no murmur. The respiratory sounds all over the chest are very feeble; the diaphragm does not seem to be acting; there is some bulging of the left lower ribs. Area of hepatic dulness increased. Urine alkaline, sp. gr. 1023, no albumen. On the 13th he reverted to the sulpho-carbolate of soda and caffeine mixture. On May 17th he was ordered in addition 6 grains of naphthaline every four hours.

May 20th. Condition not much altered; there are several boils over his body which are poulticed. He has four or five loose motions daily. He is now placed on milk diet and soda water.

May 23rd. Yesterday and to-day the morning temperature has been normal, but there has been an evening exacerbation of two degrees. Pulse 92, small and weak. Heart's action very feeble and sounds almost inaudible. Respiratory sounds very feeble. He is troubled with cough, and muco-purulent expectoration. On the 21st he coughed up a small quantity of bright arterial blood. Knee-jerks present; no ankle clonus. Ordered charcoal.

May 29th. Improving. Temperature to-day 98° to 99·8°. From this time it remained normal. The febrile movement extended over eighteen days. During the first five days it remained at a lower but more continuous level, and for the last eight days the morning temperatures have been normal, but there has been an evening exacerbation of two or three degrees, there has also been considerable diarrhœa, so the whole course of the affection has pointed to a relapse though it was complicated with numerous boils over the body, arms, and in the axilla. Ordered two eggs.

June 7th. His temperature has remained normal since last note, and he is progressing favourably. Placed on ordinary hospital diet.

June 9th. Ordered mutton chop and two pints of milk.

June 12th. Ordered roast slice. Net weight 152 lb.

June 19th. Net weight 155½ lb.

June 20th. He has been up part of each day for some time. His heart's action has been feeble and his lower limbs have been considerably swollen. Ordered the following mixture, and all others to be stopped. ℞ Tinct. Ferri Perchloridi, ♏x. Liq. Ammon. Acetatis, ℥ii. Tinct. Digitalis, ♏x. Syrupi, ℥i. Aq. ad ℥i. Quartâ quâque horâ sumenda. He continued to improve rapidly, and was discharged, quite well, on June 30th.

CASE 14. *Severe case of Typhoid Fever; Pericarditis; Pleuritic Effusion; Bronchitis; Fifteen days in the tank; Cure.*

Joseph McT., aged 28, fireman, admitted to hospital June 3rd, 1890. He has been an intemperate man, but enjoyed fair health till the commencement of the present illness. He arrived in Liverpool yesterday, from New Orleans. For last fourteen days he has suffered from diarrhoea and headache. He has had rigors almost every day, and says he has lost a lot of flesh. He now complains of frontal headache, and restless nights. Tongue coated with a yellow fur, appetite bad, feels very thirsty. There is profuse diarrhoea. There are several rose-coloured lenticular spots on abdomen and back. There is distinct pericardial friction heard over the sternum, and in the 3rd and 4th left intercostal spaces. There are crepitant râles at the bases of both lungs. Hepatic and splenic dulness increased. Temperature 103°; pulse 108. Ordered milk and soda water.

June 4th (sixteenth day). The pericardial friction is to-day inaudible. At the bases of both lungs the percussion is impaired, breathing feeble, vocal fremitus diminished; diarrhœa profuse, motions liquid, brownish colour, very offensive, and acid in reaction. Temperature, 102°-103°, pulse 92, respirations 34. ℞ Ammon. Carb., gr. v. Tincturæ Cinchonæ flav., ♏xx. Aq. Chloroformi, ad ℥i. Every four hours.

June 5th (seventeenth day.) His temperature this afternoon reached 104°. Net weight 152 lb. He was placed in the tank at 6-30 p.m., the temperature of the water 90° Fah.

June 6th. He had a good night; this morning he complains

of feeling cold, but is otherwise comfortable. Tongue moist, pulse 100, respirations 32. One formed motion. He took his milk freely during the night. His temperature steadily declined, and at 4 p.m. to-day it had fallen to 99·2°. There was then a slight rise to 100·8° at midnight.

June 7th. He was very restless last night, and had 10 grains of choral, and 10 grains of potass. bromid. Tongue moist; only one motion. Pulse 92; respirations 28. Add to each dose of mixture, of June 4th, two grains of caffeine.

June 9th. Slept well. Tongue moist. He feels comfortable. Bowels have not acted since the 7th. There has been a steady fall of temperature since yesterday morning, and at noon to-day 96·2° was recorded. The temperature of the tank was then raised to 95°.

June 11th. Slept well. Tongue moist; one motion. His temperature gradually mounted up to 102·4° at noon yesterday, and the tank was then lowered to 90°. There has been a gradual decline since, except a temporary rise to-day, when he was out of the tank. At 4 p.m. 98·6°; 8 p.m. 101·2°; midnight 98·8°. Ordered 6 grains of naphthaline every four hours.

June 18th. There has been daily rises of temperature when the patient was out of the tank for sanitary purposes, but a low level has been maintained, and his general condition is improving. Ordered bread and milk.

June 20th. He was taken permanently out of the tank to-day. Pulse 92, weak. Heart sounds normal, except that at the apex the first sound is very indistinct. No friction nor evidence of pericardial effusion. Respiratory sounds normal, except a little roughness at both bases. Knee-jerks exaggerated. No ankle clonus.

June 23rd (thirty-fifth day). After he was taken out of the tank there was an evening rise of temperature on the 20th and 21st to 102·2°; yesterday, and to-day it only reached 101°.

June 28th. Since last note his temperature has been about normal. He is to-day placed on ordinary diet.

July 5th. Net weight 150 lb. July 12th. Net weight 152 lb.

July 14th. Discharged quite well.

CASE 15. *Case of Typhoid Fever; Relapse for which he was treated in the tank for six days; Cure.*

Thomas W., aged 19, fireman, admitted to hospital June 24th, 1890. This man's illness began about 9 days ago on board ship, while returning from Alexandria. For last six days he has been confined to bed with general malaise, headache, and pains in the back and limbs. On admission he was found to be suffering from a mild attack of typhoid fever. He was ordered 4 pints of milk. He progressed favourably until the 19th day, when there was a marked evening exacerbation to 103°. The following morning it was 101°, and in the evening 103·8°. On the 21st day, M. 102°; E. 104·8°. Motions loose, yellow, and alkaline. ℞ Hydrarg. Sub-chlordi, gr. ¼. Naphthalinæ, gr. vi. Every four hours.

Twenty-second day. He was placed in the tank to-day. Net weight 120 lb. He progressed favourably, and was taken out of the tank on the twenty-eighth day (July 13th). On the following day his net weight was found to be only 111 lb. For the following week there was an evening exacerbation. He was discharged quite well on August 7th, 1890.

CASE 16. *Case of Typhoid Fever; Relapse; Six days in the tank; Cure.*

Carl O., aged 30, sailor, admitted to hospital July 15th, 1890, on his arrival from South America. His illness began 14 days previously, with shivering, headache, and sleeplessness. On admission he presented well-marked symptoms of typhoid fever. He complained of bad frontal headache, thirst, and loss of appetite. Tongue dry and slightly furred; pulse 92, soft, and moderately full; temperature 102°; heart and lungs healthy; hepatic dulness normal; splenic dulness increased. Many well-marked lenticular rose spots over the abdomen. Knee-jerks exaggerated; no ankle clonus; no diarrhœa. Ordered 4 pints of milk daily.

July 17th (sixteenth day). He did not sleep well. Tongue dry; pulse 88, weak. Heart sounds feeble. Temperature, last night and this morning, 103°. Motions loose, yellow, and

offensive. Net weight 103 lb. Ordered him to have, in addition to his milk, peptonised bread and milk, and kolatina. ℞. Naphthalinæ, gr. vi., every four hours.

July 19th. He did not sleep at all last night, though he had one drachm of paraldehyde, and 10 minims of nepenthe. He is now quiet and apathetic; perspiring profusely. There are a few rhonchi heard over the chest.

July 21st. He slept very little last night, though he had fifteen minims of nepenthe. He is taking nourishment badly, and had only two pints of milk and a little bread during the last 24 hours.

July 22nd. ℞ Caffeinæ, gr. ii. Tincturæ Belladonnæ, ℥x. Tinct. Cinchonæ Co., ℥ss. Syrupi Simplicis, ℥i. Aq. Chloroformi, ad ℥i. Every fourth hour. Porridge.

July 24th (twenty-third day). He had no draught last night, but slept fairly well. He was sick last night, for which he had several doses of bismuth, and two ounces of brandy. Heart sounds feeble: pulse weak. There is dulness at base of right lung. He coughs occasionally, and the expectoration consists of mucus tinged with blood. Knee-jerks lively; no ankle clonus. Temperature has been normal for three days. Add to each dose of mixture, of July 22nd, Sodæ Sulpho-Carb., ℥ss.

From this time the patient progressed very favourably, and at the end of the month he was out of bed. From August 4th to 8th, inclusive, he was out of doors for a short time each day. On the latter day he had some currant cake from a friend, and on the morning of the 9th he had a relapse. The temperature that evening reached 104°, and from this time to the 12th it ranged between 102° and 104°, the mean of 18 observations being 103·2°.

On the evening of the 12th he was placed in the tank at 90°, and by the following morning his temperature had fallen to normal. During his stay in the tank there was a slight evening exacerbation of one or two degrees. His net weight when placed in the tank was 99 lb. His tongue, which was dry and tremulous, became moist; his headache disappeared.

His tongue remained tremulous, and there was general muscular tremor, as also some fibrillar contraction about the angles of his mouth. His pulse became slower and stronger; his appetite and general condition improved. He was put on the mixture prescribed on July 22nd and 24th. The liberal diet of porridge, fish, chicken, eggs, &c., which he had been receiving, was reduced to bread and milk.

August 18th (tenth day of relapse). To-day his temperature ranged between 98° and 99°; pulse 84. He felt very well, and at 7 p.m. he was taken out of the tank.

August 19th. Immediately after being taken out of the tank his temperature began to rise, and at 4 p.m. this afternoon it reached 103°. He became drowsy and apathetic. His tongue became dry and furred. Heart sounds feeble. Lungs fairly healthy, except a little harsh breathing at left base. There were a few typhoid spots over abdomen. No ankle clonus. Knee-jerks exaggerated. His bowels were more or less confined throughout, and he required frequent doses of calomel. From this time the morning temperature was about normal, but there was a daily exacerbation of two to three degrees, up to the twentieth day of the relapse.

August 30th (twenty-second day of relapse). His diet, to-day, was supplemented by the addition of fish, and on September 7th he was also allowed chicken.

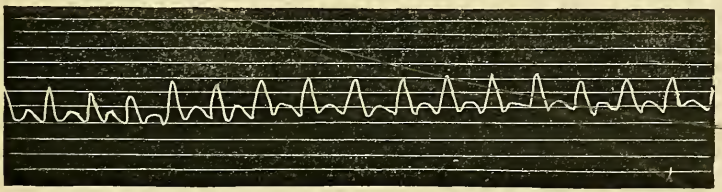
His net weight on September 4th was 93½ lb, and on September 11th 106 lb. He was discharged on September 11th quite well.

CASE 17. *Severe case of Typhoid Fever; Free Hæmorrhage; Twenty-three days in the tank; Cure.*

Edward G., aged 14, admitted to hospital August 29th, 1890, on the fourth day of an attack of typhoid fever. He was a healthy looking boy, who had enjoyed good health prior to this illness. A brother, aged 18, had typhoid fever in June, and recovered; a sister, aged 5, died from the same diaease in the Royal Infirmary in July.

On August 25th, he took ill with headache and general

malaise; and since the 26th, he has been confined to bed. His temperature, as recorded prior to admission, ranged from 102° to 103·8°, and on that evening it reached 104·2°. He complains of headache, thirst, and loss of appetite. Face flushed, pupils dilated, right more so than left. Tongue moist, white fur in centre, clean at tip and edges; motion formed, yellow, alkaline, and offensive. No abdominal distension, but tenderness on pressure; no gurgling in right iliac fossa. No rose spots. Hepatic dulness normal, splenic dulness increased. Pulse 108, full, soft, and compressible. Heart sounds normal. There are a few rhonchi, but otherwise lungs healthy. No ankle clonus, cannot elicit knee-jerks. Ordered four pints of milk daily, and five grains of naphthaline every four hours.



E. G., 30-8-90, Pulse 120, Pressure 2 ozs. (before being put in tank).

August 31st (sixth day). He was placed in the tank yesterday afternoon at 90°, and at 8 a.m. this morning the temperature was 97·4°, the tank was then raised to 95°. He slept fairly well, and felt comfortable. Pulse 104. Tongue moist, coated with a white fur. He is not coughing much. Takes liquid nourishment well.

September 1st. Since the tank was raised to 95°, his temperature has increased, and when out of the tank for three-quarters of an hour this morning it ran up, and at 12 noon 102·4° was recorded. Tongue moist. Bowels confined. He took over five pints of milk during the last 24 hours. He is now ordered, in addition, peptonised bread and milk, two ounces of butter, and porridge.

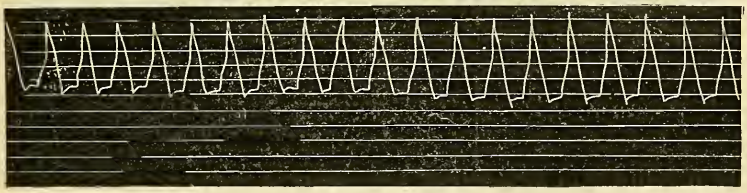
September 3rd. He was taken out of the tank at 11-30 last night, as the hot water pipe had burst, and consequently the temperature of the tank could not be maintained. His temperature rose to 103·6° at 4 a.m. At 8 a.m., it was 102°; at noon,

102·8°: and at 1-30 p.m. he was replaced in the tank at 90°. Tongue not so moist. Pulse 124. He is rather deaf; no abdominal distension, but there is a sense of resistance, and he complains of pain. No rose spots, no ankle clonus, cannot elicit knee-jerks. His bowels have been moved twice since he was taken out of the tank, motions slightly formed, yellow, and acid. Urine alkaline, sp. gr. 1025, a trace of albumen, a few triple phosphates, and numerous crystals of urate of ammonium; gives purplish red colour with Ehrlich's test.

September 9th (fifteenth day). Up till to-day he progressed favourably since last note. His bowels have been confined, and only about one motion every alternate day. He had not had a motion for two days, and last night he was ordered two grains of calomel. He had also two doses of chloral and bromide but did not sleep well, and was very fretful. At 7-30 this morning he told the nurse that his bowels had moved and he wished the tank cleaned. She found the water very red with blood. His temperature was 99°. Dr. Askin had him taken out of the tank at 9-30. The tank was found to contain a large quantity of blood, some of which was clotted, and only a slight amount of fæces. He was ordered 10 minims of turpentine and 5 minims of laudanum every three hours. At 11 a.m. his temperature (out of the tank) had reached 101·4°. Pulse 128, small and weak. He is very drowsy; there is some subconjunctival hæmorrhage in both eyes. Tongue dry. After two doses of the medicine it was discontinued as he was sleeping quietly. Iced-compresses to be applied to abdomen. At 1 and 4 p.m. he vomited, the matter ejected containing some blood. Temperature 103°. At 5-40 p.m. he was ordered turpentine and ergot, but half-an-hour afterwards there was some more hæmatemesis, and the medicine was stopped. Iced-compresses continued.

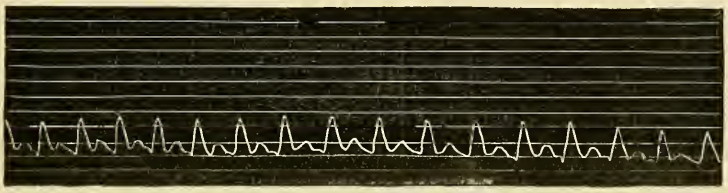
September 10th. He slept fairly well, and was not sick. He took about two pints of milk during the night. Tongue rough and dry, slightly furred. Pulse 140, weak and compressible. Heart sounds feeble but clear. His bowels have not acted since yesterday morning. There has been slight epistaxis.

Mucous membranes are very anæmic. There are now numerous petechial spots on chest, back of neck, arms, and a few bright red purpuric spots on legs. Plantar reflexes well marked. No ankle clonus or knee-jerks. Iced-compresses continued to abdomen, ordered ten minims of oil of turpentine with mucilage and water every third hour.



E. G., 10-9-90, Pulse 140, Pressure 2 ozs.

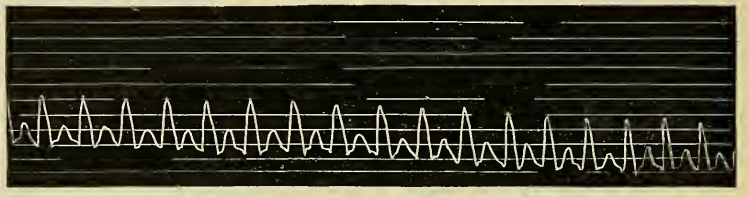
September 11th (seventeenth day). His temperature at midnight was 103·2°, and he was then placed in the tank at 90°, and at 8 a.m. his temperature had fallen to 99·2°. At 2 a.m. there was considerable hæmorrhage from the bowels, the water being quite red, and there were several clots. At 2-15 a.m. he had a starch enema with ten minims of laudanum. He then slept well till 6 a.m. His bowels acted very slightly; there has not been a good motion since the 5th. He took 2 pints of peptonised milk, and half-a-pint of kolatina during the night. 10-45 a.m., he has had a quiet sleep. Pulse 104, rather stronger. Tongue moist, says he feels better, there is slight twitching of facial muscles. 4 p.m., some dark blood clots passed, but no recent hæmorrhage.



E. G., 11-9-90, Pulse 118, Pressure 3 ozs.

September 12th. He had a very good night, sleeping soundly. Tongue is quite moist. Temperature has fallen steadily, from 102° last night to 99·8° this morning. Pulse 132, rather stronger; there has been slight cough. Bowels acted at 7 a.m.,

motion brownish red, some very dark blood clots. He took 2 pints of peptonised milk and some kolatina.



E. G., 12-9-90, Pulse 132, Pressure 4 ozs.

September 15th. He slept very well. Tongue moist. Pulse 124. Temperature 98·8° to 100·2°. Last night there was a small, dark motion, about the size of a walnut. He had two drachms of castor oil, but there has been no further motion yet. He complained several times of griping pains in the abdomen. He is taking liquid nourishment well.

September 16th. Slept well. Tongue clean and moist. He had an enema this morning, which brought away a lot of hard scybalæ.

September 18th. ℞ Ammoniæ Carb., gr. v. Caffeinæ, gr. ii. Tinct. Chinchonæ Flav., ℥xx. Aq. Chloroformi, ad ℥i. Every four hours.

September 23rd (twenty-ninth day). His temperature has been practically normal for four days, the evening rise not exceeding a degree or a degree and-a-half, and the morning temperature usually about 98°. Net weight 69 lb., showing a loss of only 4 lb. in 24 days. Taken out of tank at 3-45 p.m. Bowels confined; he had an enema which acted well.

September 24th. At midnight his temperature reached 101·8°, but with the use of iced compresses to abdomen it fell to normal at 8 a.m. Tongue clean. Pulse 128. Heart sounds clear. Lungs healthy. Knee-jerks present. No ankle clonus. He feels all right. No abdominal distension. Continue iced-compresses to abdomen. There was an evening exacerbation of about two and-a-half degrees each day till the thirty-fourth day of the disease, after which the temperature did not rise above 99°.

September 30th, net weight, 65 lb.
October 8th, 66½ lb.
October 10th, he was placed on ordinary diet.
October 14th, net weight, 65½ lb.
October 22nd, weight, with clothes, 82 lb.
October 24th, discharged quite well.

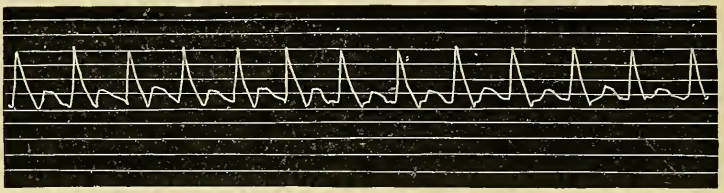
CASE 18. *Case of Typhoid Fever; Thirteen days in the tank; Cure.*

Miles W., age 22, milk-house keeper, admitted to hospital September 4th, 1890. He has always enjoyed fair health, except that during the last four months he has suffered from rheumatic pains. On the 31st ult. he did not feel well, and had headache, which has since continued. On the 1st inst., he had two loose motions, and the same on the 2nd. He was seen by Dr. Wild on the evening of that day, who found his temperature 104°, and yesterday morning 103°. Dr. Wild sent him into hospital to-day.

On admission he was perspiring freely; complained of pain in back and headache. Tongue coated with white fur in centre, red and clean at tip and edges. Slight gurgling in right iliac fossa; no distension or tenderness of abdomen; heart and lungs healthy. Pulse 112; temperature 101°, rising in the evening to 102°. Ordered 2 grains of calomel; 4 pints of milk.

September 5th (fifth day). He did not sleep well last night. Took one and-a-half pints of milk during the night. He now complains of shooting pains in the back, and headache. Face flushed; pupils dilated. Tongue coated with a brownish fur. Motions loose, greenish yellow, alkaline, and very offensive. Urine alkaline, sp. gr. 1018, no albumen, gives Ehrlich's reaction, deposit of triple phosphates and crystals of urate of ammonium. Stomach somewhat distended; spleen not apparently enlarged; not much abdominal distension; one suspicious typhoid spot; slight tenderness in right iliac fossa. No ankle clonus. Knee-jerks present. Pulse 104, rather small, moderately full and compressible. Respirations 26. Tem-

perature 102°, rising in the evening to 103·4°. Ordered boiled bread and milk.



M. W. 5-9-90, Pulse 96, Pressure 2 ozs.

September 6th. He still complains of pain in back. He had a restless night, though he took 30 grains of bromidia. He was sick this morning. One suspicious spot on chest. Respiratory sounds rather harsh. Pulse 112. Respirations 28.

September 7th. He had one drachm of bromidia, but did not sleep well. His bowels acted twice yesterday and once this morning. Motions greenish yellow, liquid, alkaline, and offensive. He was sick, and had slight epistaxis yesterday evening. Tongue dry and furred; a few typhoid spots now present on abdomen; no ankle clonus, knee-jerks not well marked. Ordered six grains of β-naphthol every four hours.

September 8th. He had 30 grains of sulphonal last night and slept rather better. Some rose spots on abdomen. Urine gave a deep port wine colour with Ehrlich's test. Net weight 131 lb. His temperature at 4 p.m. was 104°, and at 4-30 p.m. he was placed in the tank at 90°. At 8 and 12 p.m. his temperature was 101°.

September 9th. He slept fairly well and felt comfortable. Tongue is still furred and dry. Pulse 92, firmer. He is taking liquid nourishment well.

September 10th. He had one drachm of bromidia and slept fairly well. He feels comfortable and is taking plenty of milk. Tongue moist, sordes about teeth. Bowels have acted several times, motions slightly formed, greenish yellow, acid, and offensive. Pulse 96. Temperature to-day did not rise above 100·2°.

September 11th. He slept well and took two pints of milk, and some boiled bread and milk during the night. Tongue

moist, yellow fur in centre. Pulse 102, small and compressible. There was a slight evening exacerbation to 102° but the mean temperature to-day was only 100·3°.

September 12th. He slept well; bowels acted three times during the night. Tongue moist, centre coated with thick yellowish brown fur. Pulse 108. Mean temperature 100·3°.

September 13th. Periodate crystals, 5 grains every four hours were substituted for the naphthol.

September 16th. He has progressed very favourably since last note. Temperature 99° to 101°. Mean of twenty-four observations 100°

September 22nd. The patient was taken out of the tank at 1-30 p.m. yesterday. His mean temperature for the previous four days being 99·15°. At 4 p.m. his temperature was 101°, and at 8 p.m. 102·6°. Iced-compresses were then applied to his abdomen. He slept fairly well and his temperature this morning is normal. Pulse 96. Tongue furred and moist. Respiratory sounds on right side of chest are rather feeble, otherwise normal. The abdomen is now rather retracted, no pain or tenderness. Knee-jerks well marked, no ankle clonus. There is a well marked papular rash on back of chest and abdomen.

September 23rd. Net weight 128 lb. ℞ Caffeinæ, gr. ii. Tinct. Chinchonæ Co., ℥xxx. Aq. Chloroformi, ad ℥i. Every four hours.

September 30th. Net weight 115 lb. Ordered fish diet.

October 7th. Net weight 118 lb.

October 14th. Net weight 121 lb.

October 15th. Discharged quite well, though yet below his usual weight.

CASE 19. *Typhoid (?) Fever; three days in the tank; Cure.*

William R., age 19, fitter, admitted to hospital October 7th, 1890. He has always been healthy until the present illness, which began on September 26th, with a rigor, headache and pains in the back. He was unfit for work the following day, but did not take to bed till the 30th. He now complains of a dull

heavy pain in back, but no headache. Pupils normal. Tongue dry, clean at tip, elsewhere coated with a thick yellowish fur; sordes on lips and teeth; no rash. Temperature 103°. Bowels have been rather confined throughout, except after a dose of castor oil, which he had about a week ago. Net weight 122 lb. Ordered three grains of calomel. Four pints of milk, soda water, and 12 ozs. of bread daily.

October 8th. He did not sleep well. Bowels have acted twice, motions loose, yellowish, neutral, and very offensive. Pulse 88, small and compressible. Respirations 36. Heart and lungs normal; hepatic and splenic dulness about normal. No abdominal distension, nor any tenderness. No ankle clonus, knee-jerks well-marked, some muscular tremor. Temperatures 4 a.m., 103·2°; 8 a.m., 102·8°; 12 noon, 101·4°; 8 and 12 p.m., 103°. This evening he presented a slight dusky mottling on abdomen, and he was strictly isolated.

October 9th (fourteenth day). He had a very restless night, and was very delirious. Tongue dry, and tremulous; lips dry, and coated with sordes. Decubitus on side, and seems to have great difficulty in turning, owing to pains in his back. There is an obscure dusky mottling over chest and abdomen. Dr. Hope, Assistant Medical Officer of Health, saw him with me, and pronounced the case undoubtedly one of typhoid fever. This authoritative judgment relieved my mind somewhat, but it did not entirely satisfy me, and in order to err on the safe side and prevent any risk of infection if the case should turn out to be one of typhus, I had him immersed in the tank, though I did not consider the case a very severe one. His temperature which was 103·2° steadily fell after he was placed in the tank at 92°.

October 10th (fifteenth day). He was very restless last night, and tried several times to get out of the tank. He had fifteen minims of laudanum. He feels much better to-day. Tongue furred but quite moist, no pain in back. Pupils rather contracted. He is drowsy and inclined to sleep. Pulse 76. Temperature has declined from 103·4° at 4 p.m. yesterday, to 99·2° at noon to-day; there was a slight evening rise to 100°

The dusky mottling is less marked. Splenic dulness four and-a-half by three and three-quarter inches. Ordered 4 grains of calomel.

October 11th (sixteenth day). He had a quieter night, but did not sleep much. Looks much better this morning. Tongue rather dry. Pulse 72. Bowels have not acted since the morning of the 8th, though he has had two doses of calomel of 4 grains each. He is taking milk freely. Ordered one ounce of castor oil.

October 12th. He had 10 minims of laudanum, and later 10 minims of nepenthe, and he slept pretty well during the night. Tongue moist, slightly furred. Pulse 72. Bowels have acted freely, motions yellow and formed. Temperature normal. He was taken out of the tank this afternoon to make room for his mother. Iced compresses were then applied to his abdomen.

October 13th. He had no draught last night, and slept well. The iced compresses are continued, and his temperature has not risen. Tongue rather dry and sticky; pulse 80; respirations normal. Heart sounds clear. No distension of abdomen. Knee-jerks marked; ankle clonus present on both sides.

October 14th (nineteenth day). He slept well. His temperature rose to 101° at midnight, but by 8 a.m. it had fallen to normal. Iced compresses continued. Heart sounds feeble, rhythm irregular. Pulse slow, infrequent, irregular, and of moderate tension. Tongue dry, and slightly furred, papillæ well marked.

October 15th. Net weight 111 lb., showing a loss of 11 lb. in 8 days. Ordinary diet.

October 24th. Net weight 113 lb.

October 27th. Weight in clothes, 125 lb. He has been out of doors for several days. Discharged to-day, quite well.

Case 20. *Severe case of Typhoid (?) Fever; Three days in the wet-pack; nine days in the tank; Cure.*

Mary R., aged 39, housewife, mother of last patient, admitted to hospital October 7th, 1890. She is the only survivor out of twelve children. Her father is alive at the age of 63.

Mother died in parturition. This patient was married at the age of 17, and is the mother of 10 children, and has had three miscarriages. After the birth of her fourth child, 12 years ago, she was laid up for 19 weeks with "white leg." After the birth of her last child, two years ago, she was ill for 5 months with "white leg."

Her present illness began ten days ago with headache, languor, and a disagreeable taste in her mouth. She attended to her household duties to the 5th inst., since which time she has been confined to bed. She always suffers from constipation, and her bowels have been confined since she took ill, except when she has had a dose of liquorice powder, or an enema.

She is a moderately well-developed, fairly nourished woman, dark sallow complexion. She has an anxious expression, talks in a low dull tone, and moans with every respiration. She is quite intelligent. Skin of a jaundiced hue, hot and dry. Temperature about 104°. Tongue moist, coated in centre with a soft white fur. Complains of thirst. She vomited twice to-day, the matter consisting of curdled milk and ropy mucus. Abdomen large, flabby, and distended. She yields to pressure in the right iliac fossa. No rash; knee-jerks present; plantar reflexes well marked. Heart and lungs normal. Four pints of milk daily; ten grains of periodate crystals every four hours.

October 9th (twelfth day). She slept at intervals during the night. She has not been delirious, but moans constantly. Muscular tremor well marked around the mouth. Abdomen much distended. No rash. Tenderness has disappeared. Tongue coated with a thick fur. Eyes clear; and she is intelligent. Pulse 120. Urine acid, sp. gr. 1019, albuminous. In the afternoon there was an obscure, dusky mottling over the abdomen. Dr. Hope saw her with me, and pronounced the case to be a severe attack of typhoid fever; she was, however, isolated. There has been a continuous febrile temperature since admission of about 104°., only varying a few points. At 4 p.m. to-day it reached 104·8°, and at 4-30 p.m. she was put

in a wet-pack. She had 4 grains of calomel. Net weight 112 lb.

October 10th. Her temperature has fallen about a degree. the mean yesterday being 104·2°, and to-day 103·3°. Pulse 112. She is quite intelligent, and complains of the cold sheet. Tongue dry, coated in centre with white fur, tremulous. There is general muscular tremor, which is especially marked about the mouth. She was sick once during the night, and her bowels were freely moved; motion formed, brown colour, acid reaction. Spleen large. Other organs appear normal.

October 11th (fourteenth day). Passed a very restless night and was delirious. Pulse 136. Respirations 40. Mean temperature to-day 103·4°.

October 12th (fifteenth day). She had ten minims of laudanum, and fifteen minims of nepenthe during the night, but was very restless, and did not sleep at all. She only took one pint of milk and a little soda water. She is now lying on her back, moaning, and complains of the cold. Eyes dull. Pupils not much contracted. Tongue dry and furred, and she cannot protrude it far. Heart sounds dull. Respiratory sounds feeble, but no dulness. Pulse 152, very weak. Respirations 30. She is passing urine and fæces involuntarily. She is hyperæsthetic, and trying to elicit ankle clonus causes her great pain. Knee-jerks present. Subsultus tendinum present in left arm. Temperature 103·2°. At 2-30 p.m. she was placed in the tank at 94°, and would have been placed in it sooner, but we have only one tank room, which was occupied by her son, and we cannot mix the sexes. Her temperature steadily fell, and by midnight it was only 99·2°.

October 13th (sixteenth day). She had a good night, slept from 12-30 to 6 a.m. Tongue moist, pupils contracted. Pulse 144, weak. She appears more at ease, lies quietly with her eyes closed, but moans frequently. Owing to the general tremor it is impossible to take the temperature in her mouth, and so from this time it is directed to be taken in the rectum; this makes the temperature appear at a higher level than it would if taken in the mouth. This evening it rose to 103°,

Motion large, partly formed, yellow, and very offensive. Urine acid, sp. gr. 1022, albuminous.

October 14th. Had ten minims of nepenthe, and slept fairly well, but was restless and moaned frequently. Temperature at 8 a.m. in rectum 102·4°. Pulse 144, small and compressible. Tongue moist. She complains of the water being cold, though it is 94°. There is general muscular tremor. Mean rectal temperature 102·2°. Bowels confined, ordered one ounce of castor oil.

October 15th (eighteenth day). She had a restless sleep, and moaned nearly all night. Puts out her tongue better this morning; it is moist. Pulse 136, small and weak. Bowels acted freely, motion yellow, partly formed, and offensive. She is taking nourishment well. Mean rectal temperature to-day 101·2°.

October 16th (nineteenth day). She had fifteen minims of laudanum, and passed a very good night. Tongue clean and moist. Bowels moved. Pulse 124, stronger. Mean temperature 100°.

October 21st (twenty-fourth day). She has progressed very favourably since last note. Her temperature has been fairly normal, and her pulse has now come down to 104. In addition to her milk she has been taking bread and peptonised gruel. She was taken out of the tank this afternoon. ℞. Caffeinæ, gr. ii. Tinct. Cinchonæ Co., ℥xxx. Aq. Chloroformi, ad ʒi. Every four hours.

October 23rd. Ordered fish and ordinary diet.

October 25th. Net weight 114 lb., which shows a gain of 2½ lb., therefore what flesh she lost during the febrile stage has now been more than restored. She was discharged quite well, November 3rd, 1890.

Case 21. *Very Severe Case of Typhoid Fever; Relapse; Thirty-one days in the tank; Cold water enemata; Death; Post mortem.*

Ann K., age 36, housewife, admitted to hospital, October 27th, 1890. She is the mother of nine children, seven of whom are

alive; the eldest fifteen years, and the youngest one year. The eldest boy and eldest girl have been recently in this hospital suffering from typhoid fever, and the latter is still here. On the 16th and 17th inst., she was engaged working, and on the latter day she felt chilly; she did some work on the 18th, but since then she has been confined to bed. On admission she was in a very collapsed condition. Temperature in axilla 103°, extremities cold, pulse small, weak and rapid. Dr. Barr ordered her some brandy, and 3 grains of calomel.

October 28th (twelfth day). Urine and fæces passed involuntarily. During the night she had two ounces of brandy, and about 24 ounces of milk. It was with great difficulty that the milk was given—the patient holding it in her mouth, and then spitting it out. She slept the greater part of the night, and is now in a very drowsy, stupid state; answers questions when loudly spoken to, but quickly relapses into a stupid lethargic condition, with low muttering delirium. Dorsal decubitus. She has some difficulty in putting out her tongue, which is dry; sordes on lips and teeth. Eyes dull, pupils about normal size. She will not swallow any fluid at present. Temperature at 8 a.m., in axilla, 102·8°; pulse 128, very small, weak, and irregular; respirations 36. The first cardiac sound at apex is inaudible, second sound not loud but sharp and clear. Respiratory sounds anteriorly below right clavicle are rough in character and accompanied by some rhonchi; anteriorly on left side fairly normal; posteriorly there are many small crepitant râles, with harsh breath sounds; percussion note fairly resonant. Hepatic dulness increased. Splenic dulness measures 6½ by 5 inches. Abdomen full, soft, and flabby. There are a few rose spots which disappear on pressure. Numerous petechial fleabites. No ankle clonus. Knee-jerk on left side feebly marked, more easily elicited on right side. Her extremities are kept warm by hot bottles. Ordered 2 grains of caffeine, and one minim of Liq. Atropini Sulph. every 3 hours; malted milk as freely as can be administered. She was placed in the tank at 11-30 p.m.; temperature of of the water 92°. Her temperature to-day fluctuated between

101° and 103°. Temperature to be taken in the rectum. Net weight 118½ lb.

October 29th (thirteenth day). Drowsy and semi-conscious. Tongue moist, she cannot protrude it much; no sordes on teeth. Bowels did not act to-day. Temperatures, 4 a.m., 103°; 8 a.m., 101·2°; 12 noon, 102·2°; 4 p.m., 102·4°; 8 p.m., 103°; 12 midnight 104°.

October 30th (fourteenth day). She is in a very drowsy apathetic condition, and can scarcely be roused; she only protrudes her tongue very slightly, but it is clean and moist. Temperature of tank, 92°. Pulse small and feeble; face dusky livid hue, mucous membrane rather purple. Eyes bright, pupils normal. She takes her nourishment, which consists of milk and malted milk, badly, and had very little during the night. There has been no vomiting. Her bowels were fairly moved this morning, after a dose of calomel and an enema. She had another dose of 3 grains of calomel. Her skin feels cool, but the temperature in rectum is very high, the records to-day being 104·8°; 105·4°; 105°; 104·6°; 104°; 103·8°. Ordered one minim of 1 per cent. solution of nitro-glycerine to be added to each dose of her mixture.

October 31st. Slept very well last night, and took nourishment better. She had 12 ounces of milk and some bread and milk. Medicine every third hour. At 12 a.m. she had 10 grains of β-naphthol, and 10 grains of salicylic acid suspended in milk. This she spat out. It was repeated at 4 a.m., but she again refused to swallow it. At nine a.m. she took the powder readily. Pulse 132, small, weak and irregular; she is still drowsy, but more easily aroused, and says she is better. Face flushed, dusky hue. Tongue fairly moist and clean; she is unable to protrude it far, but makes a much better attempt than yesterday.

November 1st (sixteenth day). She was very drowsy all night. Took very little nourishment, six ounces of milk and some bread and milk. Spat out the powders, but took caffeine mixture. Temperature at 8 a.m. 103.2°. Respirations 22. Pulse small, weak, irregular, compressible, and very frequent, 137;

Heart sounds dull; the first barely appreciable. Respirations quiet. There are some rhonchi heard all over chest. She is exceedingly stupid, and it is with great difficulty that she can be roused up to comply with such directions as putting out her tongue. Her face is not quite so dusky, and the tongue and mucous membranes are not so livid as yesterday. Her temperature has been over 103° until noon to-day, when 102·2° was recorded. At 1-30 she had an enema of one and-a-quarter pints of cold water, at a temperature of 54°. Her temperature is now (2-30 p.m.) 103° in rectum. Ordered an enema of iced water containing Condy's fluid.

November 2nd (seventeenth day). Temperature at 12 a.m. and 4 a.m. 100°; at 8 a.m. 101·2°. Slept very well. Took nourishment better: 24 ounces of milk and some bread and milk. This morning, she has been induced with great difficulty to take about 5 ounces of milk. She is quite conscious, but seems obstinate. Puts her tongue out better to-day; it is moist. Face flushed; not so livid. Pulse 140, fuller and stronger, but still very weak and compressible. Respirations 28. She had 4 grains of calomel last night. Bowels have not acted.

November 3rd. Yesterday afternoon had an enema of one and-a-quarter pints of iced water with 5 ounces of peroxide of hydrogen (10 vols.) Bowels acted freely before enema was given. Motion loose, yellow, and offensive. Slept very well last night. Took about 30 ounces of milk during the night, and a little bread and milk this morning. Temperature at 8 a.m. 99°. Pulse 128, fuller, not so compressible or irregular; there are occasional intermissions. She is very drowsy still, but can be more easily roused. Tongue is clean, but rather dry.

November 4th (nineteenth day). She slept very well, and took nourishment well, about 30 ounces of milk and some bread and milk. Seems more sensible this morning; not so drowsy or stupid. Tank has been cleaned. Bowels acted slightly. Motion loose, yellow, and offensive. Temperature during night 100°; at 8 a.m. normal. Pulse still very frequent, 136, but is somewhat increased in volume, and is not so compressible.

Respirations 24. Tongue is moist, of a purplish colour. Salicylic acid and naphthol powders continued; also caffeine and Liq. atropini sulph. Nurse says she seemed much more sensible this morning. She wanted to know how long she was going to remain in the tank. She also missed Mrs. Roberts, who was discharged yesterday.

November 5th (twentieth day). Slept well. Took nourishment well. Temperature at 8 a.m. normal. Pulse 128. Bowels acted this morning, motion loose, brown, and offensive. Seems much more conscious this morning. Puts out her tongue when told to do so; it is clean but very dry.

November 6th. Not much change. Slept well and took nourishment well. Tongue clean but rather dry. Temperature at 8 a.m. 99·4°. Pulse 128. Still very drowsy. When asleep left eye is partially open. Bowels acted slightly; motion loose, yellow, but not so offensive.

November 7th (twenty-second day). Slept well. Tongue moist but purple. Temperature at 8 a.m. 100°. Pulse is very frequent (136), small, weak and compressible. Is taking nourishment well. Bowels acted this morning; stool loose. When asleep both eyes are partially open, especially left one.

November 10th. Seems very much better this morning. Says she feels quite well and is very anxious to have some fish. Slept well, tongue moist and fairly clean. Temperature at 8 a.m. 99·6°. Pulse 128, still small, weak, compressible, and somewhat irregular in rhythm and force. Bowels acted this morning, motion partially formed, yellow, and offensive. Face flushed, eyes bright, pupils normal. There is slight conjunctivitis in left eye.

November 11th (second day of relapse). Yesterday evening at 8 p.m. temperature ran up to 102°. At 12 a.m., was 100°; at 4 a.m., 99·8°; and at 8 a.m., 102·4°. She slept well, and is taking nourishment all right. Says she feels all right. Is not coughing. Tongue is furred, but moist. She is at present sleeping with eyes half open. Had 4 grains of calomel yesterday. Bowels have not acted since. Pulse at the wrist is not so frequent this morning, but is very difficult to count as it is

very irregular in force. Heart sounds almost inaudible. Ordered fish and Benger's food. At 5-30 p.m. she had an iced enema, temperature of water 48° (Oiss). At 4 p.m. temperature was 101·4°; at 12 midnight it fell to 100°.

November 13th (fourth day of relapse). Yesterday morning at 8 a.m. temperature was 102·6°; at 10-45 another iced enema was given, temperature of water 38° (Oiss); it was retained some time. On the 11th had some fish (fried flat fish) in the evening, and yesterday had some boiled flat fish. Bowels have not acted since yesterday morning after enema. Slept well last night, and took nourishment well. Tongue moist. Pulse 136, still very weak and irregular. Heart sounds are very irregular. Temperature at 8 a.m. 101·6°. At 11-45 a.m. had iced enema (Oiss), with peroxide of hydrogen (5 oz). At 12 p.m. temperature was 99·9°. At 8 p.m. iced enema was repeated as temperature was 101·6°.

November 14th. At 12 a.m., temperature was 100°; at 4 a.m., 100°; at 8 a.m., 98·2°. Tongue moist. Bowels acted to-day; motion formed and yellow. Naphthol and salicylic powders discontinued.

November 15th (sixth day of relapse). During the night some discharge was noticed from the right ear. This morning the discharge is purulent and very fœtid. Cannot obtain a good view of the membrane, but there is perforation, as air can be heard passing through it. Ear to be syringed twice daily with boracic acid solution, boracic powder blown in, and then to be packed with cotton wool.

November 16th (seventh day of relapse). Last night, 8 p.m., temperature was 102·4°. Iced enema was given, and at 12 a.m., temperature was 100°; at 4 a.m., 100°; and at 8 a.m., 102·8°. Iced enema was given at 10 o'clock and was well retained; at 11 a.m. temperature 101°. Patient did not sleep well last night, and was very fretful. Bowels acted this morning; stool loose, yellow, and offensive. Had 4 grains of calomel last night. Tongue is rather dry this morning. Pulse at wrist can hardly be felt and cannot be counted. Heart sounds very feeble and irregular. There is no appreciable dulness on percussion over

lungs; some moist râles and rhonchi can be heard. Cough is not accompanied by any crepitation. Ears have been syringed this morning; very slight discharge from right ear which was sweet. Abdomen is not distended, no pain or tenderness. Knee-jerks present, no ankle clonus. Naphthol powders renewed without salicylic acid.

November 20th (eleventh day of relapse). On the right hip there is a bed sore just forming, about the size of half-a-crown. Has not had any fish for the last four days. Ordered mutton broth and two ounces of butter.

November 21st (twelfth day of relapse). Slept very well last night. Had iced enema at 8 p.m. Temperature at 12 a.m., 100°; at 4 a.m., 101·2°; at 8 a.m., 102·6°. Pulse is very small, weak and compressible, difficult to count, about 136. Tongue fairly moist. Bowels acted this morning very slightly, motion yellow, and loose. No discharge from right ear. A few rhonchi and some crepitant râles can be heard over back of chest, but are not numerous. Knee-jerks present, no ankle clonus. She says she feels better, and she looks brighter and more cheerful. Heart sounds are still very irregular. On right hip there is a bed sore just forming, and on right side, quite close to fold of nates, there is a large red abraded surface which bled slightly this morning. She is at present taking only milk; she does not like Benger's food.

November 23rd (fourteenth day of relapse). Has had about three pints of milk during last 24 hours, exact quantity not measured. Had one feeder of mutton broth. Did not sleep very well. Had iced injection last night at 10-45 which was only retained for about five minutes. Bowels acted soon after it was given. Had another iced enema this morning at 9-30. Bowels acted soon after receiving it, and she complained of pain in abdomen. Tongue is dry. Pulse 140, regular and more easily counted. Temperature at 8 a.m. 102°. Right heel is rather sore; there is a raw surface about size of a crown piece. Nourishment for last 24 hours, viz., milk, 38 oz.; Benger's food with milk, 30 oz.; gruel, 10 oz.; mutton broth, 15 oz.; butter, 2 oz. November 24th. Net weight 96 lb.

November 28th (nineteenth day of relapse). About 11 p.m. I saw the patient, who was then in a very collapsed condition. Temperature at 10.30 in rectum 96°; temperature of tank 93°. Respirations 24, laboured and sighing. Pulse very weak and compressible. Patient is in a drowsy, stupid semi-conscious condition. At 11-30 temperature in rectum 97·8°; temperature of tank 95°, raised to 100°.

November 29th. 1 a.m., rectal temperature 99·4°. She was taken out of tank as her breathing had become much worse. She was quite unconscious, conjunctivæ completely insensible to touch, pupils normal. She appeared to be dying. Atropine $\frac{3}{50}$ grains, (two injections with interval of quarter-of-an-hour). Aether (℥xxx.) hypodermically. Caffeine, 3 grains, hypodermically. Strychnine liquor, ℥x., repeated in about 20 minutes. Hot tins applied to feet and legs. Hot stupes applied to heart. She rallied wonderfully after this; pulse became stronger; conjunctivæ responded to touch. Temperature at 1.45 a.m., 98·2° in axilla; at 2.15 a.m., 98·8; at 2.45 a.m. she became suddenly worse and died.

November 30th; Noon. Post Mortem.

Rigidity present; slight lividity of posterior surface. The body is spare, but there is no extreme emaciation, and there is slight œdema of subcutaneous tissue of lower extremities. There is an abrasion of the skin over sacrum, and right heel. On laying chest and abdomen open there is a layer of subcutaneous fat varying from a quarter to half-inch in thickness, and there is also a considerable amount of fat in omentum and mesentery. Left lung weighs 1¼ lb., slightly œdematous; structure healthy, save some emphysema along anterior margin. Right lung weighs 17½ ounces, is slightly œdematous; marked emphysema of upper lobe; no pleuritic adhesions. Kidneys: right weighs 7½ ounces, capsule strips easily, section pale and slight fatty infiltration. Left weighs 5½ ounces, and is similiar in appearance to right. Heart weighs nine ounces; right side contains small quantity of rather light coloured fluid blood, and a small decolourized clot, extending from right auricle into pulmonary artery. The

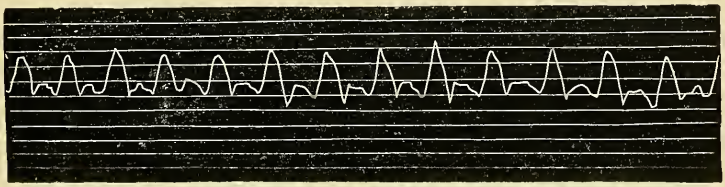
walls of right auricle and ventricle are thin and infiltrated with fat; the musculi papillares are pale, and contain some fatty striation; the tricuspid orifice admits five fingers; tricuspid, and pulmonic semi-lunar valves are healthy. Left vent. contracted and empty; muscular structure pale, otherwise healthy; mitral orifice admits three fingers; mitral and aortic semi-lunar valves normal. Liver weighs 5 lb., section pale, and feels greasy to touch. Spleen weighs 16¼ ounces; soft, friable, and almost diffluent, of a deep chocolate colour. There is no distension of the bowel. At sigmoid flexure the bowel is much contracted, but lumen not closed, and on laying open this portion it was found quite healthy, could be readily stretched, and showed no sign of stricture. At lower part of jejunum, and upper part of ileum, Peyer's patches were distinctly marked, but were smooth and not elevated above surface, and were evidently in an advanced stage of resolution. Lower down the ileum, and especially towards lowest part, Peyer's patches and solitary glands were distinctly ulcerated; many of them were in various stages of advanced resolution, while others presented a punched out appearance, with thickened margins. The peritoneal surface over these latter ulcers were markedly injected, but not thickened. There were several small ulcers in the cæcum and ascending colon. The rest of the colon was healthy.

CASE 22. *Very severe case of Typhoid Fever; Double Pneumonia; Leiter's tubes applied for four days; In the tank for nineteen days; Cold water enemata; Cure.*

Joseph L. Dean, aged 22, fireman, admitted to hospital, November 24th, 1890. The exact date of the commencement of his present illness is rather difficult to fix, but as reckoned from the commencement of headache this would be the twelfth day. About three weeks ago he suffered from a severe cold in the head which he treated with rum and milk; this was followed by pains across the top of his chest and the headache above alluded to. For the last six days he has been confined to bed. He is a well nourished, well developed man, of dark

complexion, with flushed face and anxious expression. Skin hot and dry. Temperature in axilla at 4 p.m. 105°. Eyes glistening. Tongue moist and very tremulous, coated with a white fur, and papillæ rather prominent. The abdomen is much distended; there are a few rose spots. After 4 grains of calomel the stool was loose, offensive, and acid in reaction. He has a frequent cough with viscid mucous expectoration. There are numerous bronchitic râles heard all over chest. Net weight 151lb.

November 25th (thirteenth day). Vomited twice during the night. Pulse 100, markedly dicrotic. He is very thirsty and drinks large quantities of milk. His diet consists of four pints of milk, eight ounces of bread, and two ounces of butter. ℞. β-naphthol, gr. x., every four hours. His temperature to-day remained about 103°, except at noon, when it fell to 100° for a a very short time. Urine alkaline, sp. gr. 1027; no albumen; gives a deep purplish colour with Ehrlich's test.



J. L. D., 25-11-90; Pulse 102; Pressure 2½ ozs.

November 26th. Pulse 96 to 108, markedly dicrotic. Respirations 30. Knee-jerks present, no ankle clonus. Temperature to-day 102·2° to 104·2°; mean 103·3°. Ordered one pint of mutton broth, and three table spoonfuls of extract of malt daily.

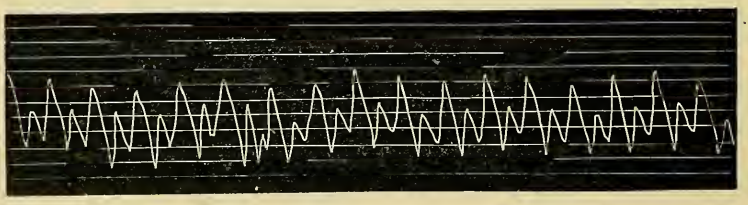
November 27th (fifteenth day). He had 10 minims of nepenthe, and slept fairly well. Tongue dry; abdomen distended. Dull percussion at base of right lung, numerous bronchitic râles over chest. Mean temperature 104·2°.

November 28th. About 9 p.m. last night his abdomen was covered with 24 yards of india-rubber tubing, through which a constant stream of water at a temperature of 40° has since flowed. His temperature at midnight was 104·6°; at 8 a.m. it was 101°, and during the day remained rather below that

level. Pulse 116, soft and dicrotic. Tongue dry, sordes on lips and teeth. The dull percussion at right base is extending, and there is now also dulness at left base; at both bases R. M. is feeble, and there are small crepitant râles. Abdomen distended and tympanitic. Calomel, 3 grains.

November 29th (seventeenth day). He had 15 minims of nepenthe and slept fairly well. Vomited twice curdled milk mixed with blood. Tongue dry, furred, and fissured, sordes on lips and teeth. There are considerable dyspnœa, and general uneasiness. Alæ nasi are dilated in inspiration. There is now dull percussion over the whole of the lower lobes of both lungs; over this area the R. M. is defective, expiration prolonged, numerous crepitant râles in inspiration, and loud snoring rhonchi both in inspiration and expiration. In front of chest there are some rhonchi, expectoration streaked with blood. Abdomen is still much distended and tympanitic. Motions loose, yellow, and offensive. Knee-jerks are well-marked, no ankle clonus; ordered mustard poultice to back of chest. One table-spoonful of charcoal three times a day.

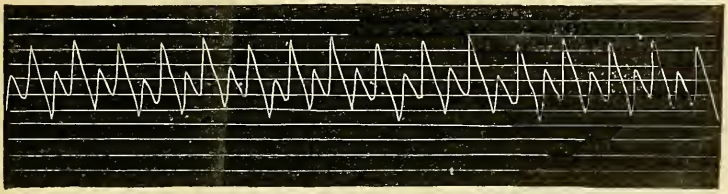
November 30th. He had a fairly good night after getting 15 minims of nepenthe. His temperature fluctuated a little yesterday, and at midnight ran up to 104°. To-day it ranged between 102° and 104°. Pulse 128. Respirations 40. Dorsal decubitus.



J. L. D., 30-11-90; Pulse 128; Pressure 2½ ozs.

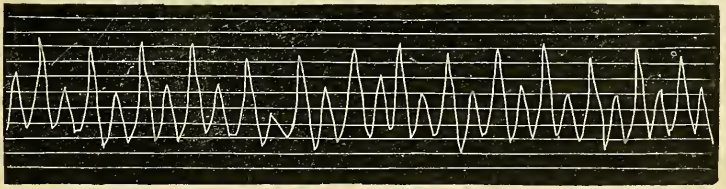
December 1st (nineteenth day). He had a very restless night. Urine and fæces passed involuntarily; motion loose, yellow, and alkaline. Dorsal decubitus. He is in a drowsy stupid condition. Over both lower lobes percussion very dull, crepitant râles and rhonchi. In front there are coarse rhonchi and a few crepitant râles. Respirations 44. Pulse 132, very

dicrotic. Tongue dry and fissured. Sordes on lips and teeth. Cheeks flushed. Abdomen distended. Splenic dulness measures $5\frac{3}{4}$ by $4\frac{3}{4}$ inches. Temperature, 4 a.m., 103°; 8 a.m., 104·8°; 12 noon, 103·8°; 4 p.m., 103·2°; 8 p.m., 104°. Net weight 139 lb.



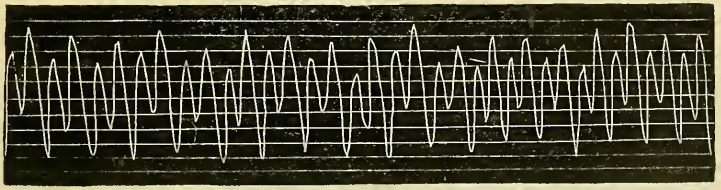
J. L. D., 1-12-90 ; Pulse 124 ; Pressure 2 ozs.

December 2nd. He was placed in the tank at 7-30 yesterday evening at 90°, and would have been immersed much sooner only the tank room was occupied by the last patient till the 29th ult., and afterwards required some alterations. He is comfortable in the water. Tongue still dry and rough. Pupils contracted. Face flushed. Pulse not so dicrotic. Temperature steadily fell throughout the day, and by midnight it was normal.



J. L. D., 2-12-90 ; Pulse 114 ; Pressure 3 ozs.

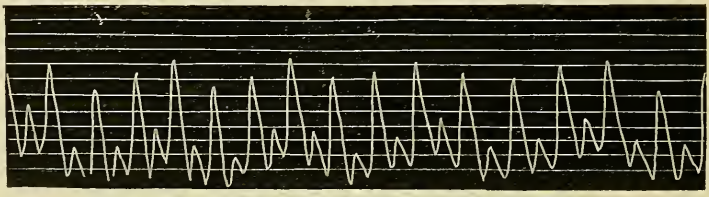
December 3rd (twenty-first day). He had a good night. Tongue moist. Pupils rather contracted. Pulse more frequent and dicrotic. Tank 94°. His temperature fluctuated to-day, the records being, 99·8°, 99·2°, 98·6°, 97·8°, 100°, 101·2°. Ordered 3 grains of caffeine, and 2 grains of quinine every four hours.



J. L. D., 3-12-90 ; Pulse 136 ; Pressure 4 ozs.

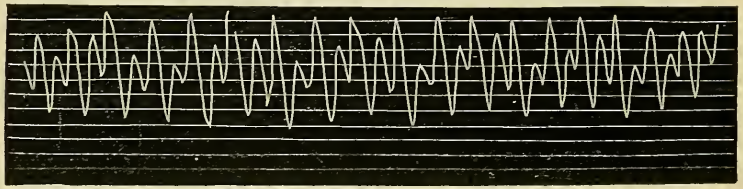
December 4th (twenty-second day). The condition of this patient has not materially altered since yesterday. He passed

a restless night, and was occasionally delirious. His face is now much flushed, and of a slightly purplish hue. Tongue clean and moist, but of a dark livid colour. He is taking nourishment well. Bowels have been slightly opened. There is considerable muscular tremor, but very little shivering to-day. His respirations are quieter, and he is only occasionally troubled with cough. Pulse rapid and very hyper-dicrotic. Abdominal distension less. Splenic dulness measures $5\frac{1}{2}$ by 4 inches. Over lower lobe of right lung the percussion is absolutely dull; breathing tubular and coarse crepitant râles in inspiration. There are the same phenomena over the left lower lobe as high as the sixth dorsal spine. Heart's action rapid: first sound double, but moderately clear; the second is accentuated at the pulmonic cartilage. Urine alkaline, sp. gr. 1017, albuminous, and gives Ehrlich's reaction. Add half-a-grain of pulv. digitalis to each powder of quinine and caffeine.



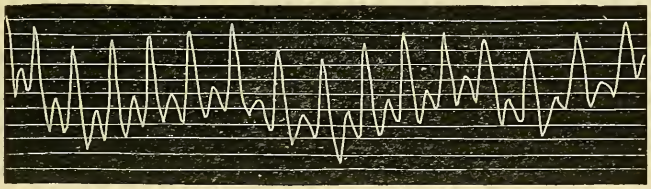
J. L. D., 4-12-90; Pulse 120; Pressure 3 ozs.

December 5th. His temperature ran up last night, and at 10-45 it was 103° in rectum. Pulse 140. Respirations 48. He then received an enema of a pint and-a-half of iced water and half-a-pint of peroxide of hydrogen. At 12-30, temperature in rectum, 101·2°; at 4 a.m., 101°; and at 8 a.m., 99·6°. He was very restless and delirious during the night. He tried to get out of the tank. Pupils are contracted. Bowels acted last night and this morning. Tongue moist, but rather livid. Cheeks flushed, of a purple colour. Pulse 128, stronger. Respirations 32. He takes his nourishment well, and says he feels better to-day. Muscular tremor well marked.



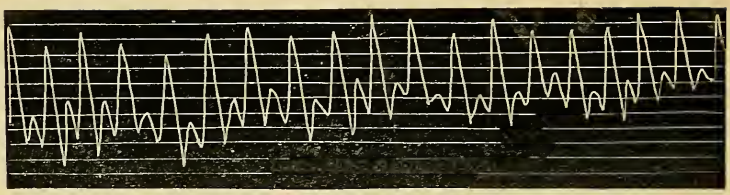
J. L. D., 5-12-90; Pulse 132.

December 6th. The condition of this patient has considerably improved during the past two days, though he is still in a very dangerous condition. His face is flushed, but is not so purplish as before. He is still restless, and rambles a good deal. Pupils contracted There is a general muscular tremor, but not much shivering. Pulse 126, quick, and markedly dicrotic. Respirations 32, shallow, but less laboured than previously. Heart's action quick, sounds moderately clear, first double, second accentuated at pulmonic cartilage. He is not disturbed for examination of lungs. Abdomen still distended, though less than before. Splenic dulness $5\frac{1}{2}$ by 4 inches. Knee-jerks exaggerated. Marked ankle clonus in both feet. There is also ready reaction of triceps at elbow joint. His temperature at midnight was 102°. The tank was then lowered to 90°, and by noon to-day his temperature was 98·8°.



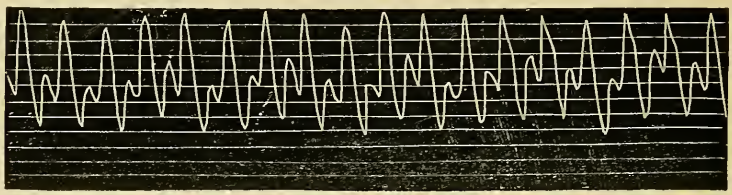
J. L. D., 6-12-90 ; Pulse 126 ; Pressure 4 ozs.

December 7th (twenty-fifth day). At ten last night patient was in a very bad, anxious condition. Temperature 103·2°. Pulse 140. Respirations 36. I gave him an enema of iced water and peroxide of hydrogen, which however he did not retain for many minutes. The tank was 94° ; I had it emptied and refilled with a stream of water at 90° running over the patient. Patient's temperature at 12-20 a.m., 102·1° ; 2-20 a.m., 102·3°. He had another iced enema, and the tank was emptied and refilled with a stream of water over the patient, at 90°. At 5 a.m., patient's temperature 101·8° ; tank 90°. At 7-40, temperature 101·8°: tank 90°. Pulse 120. Respirations 38. Taking nourishment well. In a drowsy condition all night, spoke sensibly when roused, but muttered in his sleep. Ten grains of salicylic acid every four hours are now substituted for the naphthol.



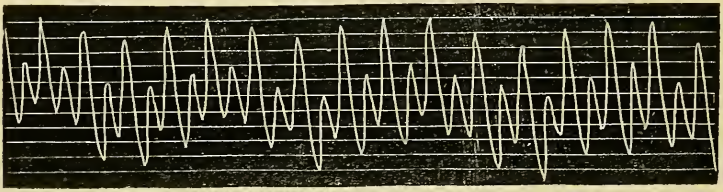
J. L. D., 7-12-90 ; Pulse 132 ; Pressure 3 ozs.

December 8th. He rambled a good deal during the night, but this morning is in much the same condition as yesterday. Temperature to-day 99·8° to 101·8°.



J. L. D., 8-12-90 ; Pulse 126 ; Pressure 4 ozs.

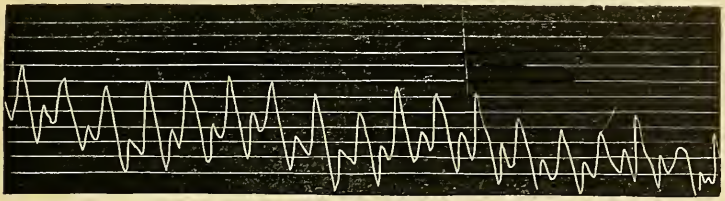
December 9th (twenty-seventh day). He does not seem so well this morning. Breathing more laboured. Face flushed. Tongue moist, coated with a thin semi-viscid layer of mucus. He is languid and drowsy, and doses with eyelids only partially closed. There is frequent lateral movements of the lower jaw, and he seems to roll his tongue towards the left buccal cavity. Mean temperature to-day 100·2°. Pulse 124-132. Respirations 32-38.



J. L. D., 9-12-90 ; Pulse 124 ; Pressure 3½ ozs.

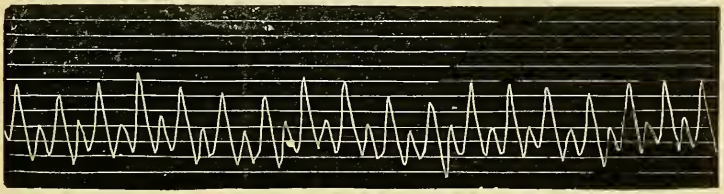
December 10th (twenty-eighth day). He had a good night, and took nourishment well. Bowels have acted freely: motions loose, yellow, and offensive. Tongue quite moist: face flushed ; pulse 116 ; respirations 32 ; temperature to-day, 99·6°-101·6°. The percussion is still impaired, but not so absolute as formerly over the right lower lobe and the lower half of the left lower lobe. Over these areas the breathing is markedly

tubular; inspiration, accompanied by coarse crepitant râles, and the V.R. and V.F. are increased. Butter is, to-day, increased to 4 ounces. Ordered ten grains of salol every four hours, in place of salicylic acid.



J. L. D., 10-12-90 ; Pulse 126 ; Pressure 3½ ozs.

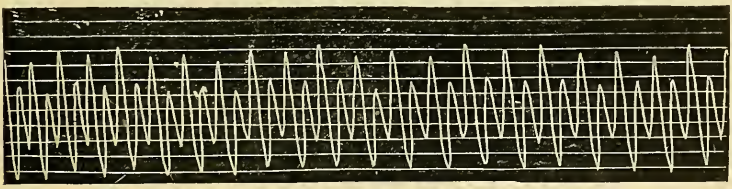
December 11th. He slept well, no delirium, and is decidely better this morning. Tongue moist: pulse 126; respirations 26; temperature 99° to 100°.



J. L. D., 11-12-90 ; Pulse 130 ; Pressure 4 ozs.

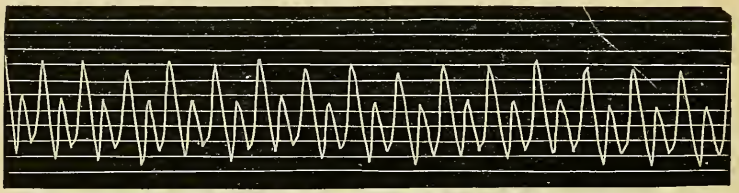
December 12th. Rather better to-day.

December 13th. He had a good night, and has not been delirious for two days. Bowels acted freely this morning. Heart's sounds dull, second sound accentuated. No enlargement of cardiac area. Percussion over lower lobes impaired, though much less dull than it was; respirations less frequent. Still numerous crepitant râles over both lungs, especially the right. Digitalis, quinine, and caffeine powders stopped.



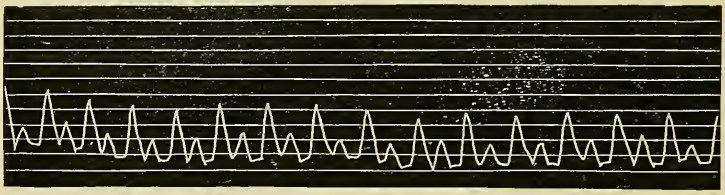
J. L. D., 13-12-90 ; Pulse 144 ; Pressure 3½ ozs.

December 15th. The powders of quinine, caffeine, and digitalis are to be resumed every six hours.



J. L. D., 15-12-90 ; Pulse 120 ; Pressure 3½ ozs.

December 16th (thirty-fourth day). He had an excellent night, and seems quite easy this morning. Respirations 20, quiet. Pulse 120, soft and dicrotic. Bowels well moved yesterday, and slightly this morning: motions loose, yellow, and offensive. Knee-jerks and ankle clonus present.



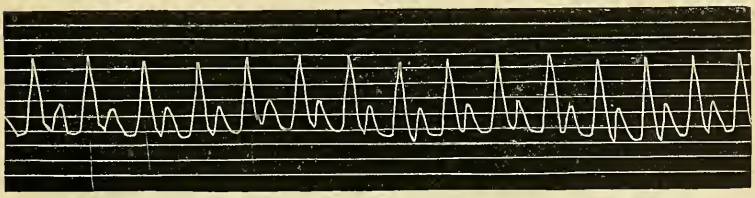
J. L. D., 16-12-90 ; Pulse 116 ; Pressure 4 ozs.

December 20th. He seems very quiet and comfortable this morning. Tongue moist; face flushed. Eyes clear, pupils moderately contracted. Pulse 124. Temperature normal.

December 21st. He was taken out of the tank at 7-30 last night. Net weight 119 lb., showing a loss of 20 lb. in the tank, and 32lb. since his admission to hospital. He was rather restless last night. Respiratory sounds in front of chest are normal. Posteriorly there is some dulness at right base, and at left base the percussion note is impaired; over rest of lungs percussion resonant. There are no râles. Respiratory murmur at right base is feeble, but otherwise fairly normal. Heart's first sound is double. Knee-jerks present; slight ankle clonus on right side, but not on left.

December 23rd. This patient having lost 20 lb. during the twenty days in the tank, and 12 lb. during the preceding seven days in hospital, and having passed through such a serious illness, is now in a very weak but not entirely helpless

condition. His eyes are bright, countenance clear with pinkish flush on cheeks. His colour has remained good during his illness and there is now no evidence of anæmia. He sleeps very well, and is taking his liquid nourishment well. He complains of hunger. Tongue clean and moist. Bowels rather constipated, but with enema the motion was semi-solid, alkaline, and rather offensive. The urine when last examined contained a little albumen, and only gave a slight rosy tint with Ehrlich's test. His body is much emaciated, there is now no distension of abdomen. Knee-jerks are lively, but there is only slight ankle clonus. Pulse quite regular, moderately full, and reveals both to finger and sphygmograph full dicrotism. Heart: apex beat in fifth interspace, in nipple line; deep transverse dulness measures 6 inches, and vertically reaches to the upper border of third rib. The impulse is moderately strong, and in second left interspace, close to the sternum, a distinct snap can be felt synchronous with the closure of the pulmonic valves. The first sound is dull and duplicated, the first element of which is loudest over the right ventricle; the second pulmonic sound is clear and accentuated; at the aortic cartilage the second sound is duller but still very distinct. Lungs: respirations are quiet, and he is not now troubled with any cough. Over lower half of back there is still marked evidence of the mustard plaster which was applied in the earlier part of illness. The percussion is fairly clear over the whole back, the breathing is loud and harsh, and of a vesicular character, but otherwise free from any accompaniments. Splenic dulness measures 4 by $3\frac{1}{2}$ inches. Hepatic dulness measures 5 inches in lines of nipple and axilla, and 4 inches in line of sternum. There is considerable maceration of the skin of palms and soles. Fish diet.



J. L. D., 23-12-90; Pulse 106; Pressure 3 ozs.

Jan. 1st, 1891, first sound of heart still double. Ordinary

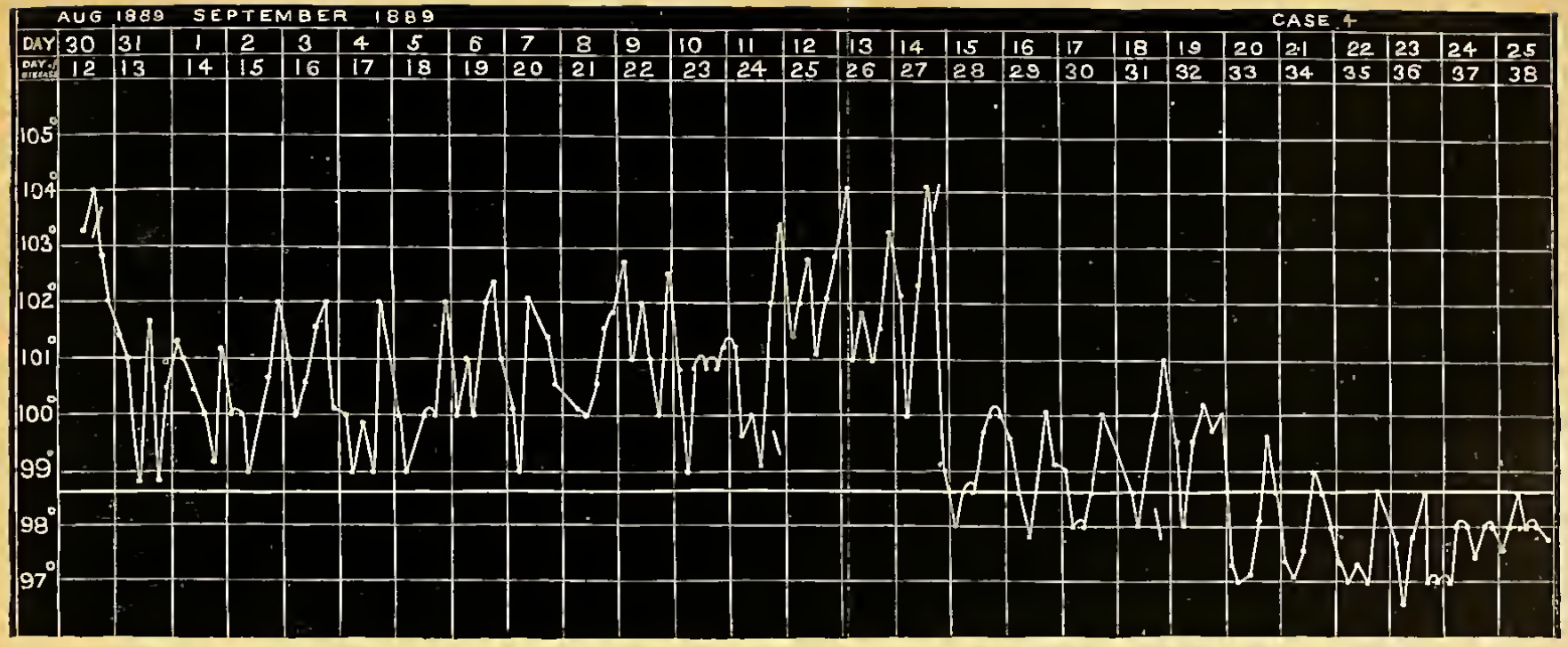
diet. Jan. 3rd, Caffeine and digitalis powders stopped as heart's action is now only 68. Jan. 5th, net weight 130 lb. First cardiac sound still double. Jan. 15th, net weight 131½ lb. Jan. 23rd, net weight 140 lb. Feb. 3rd, net weight 154½ lb. Feb. 4th, discharged quite well.

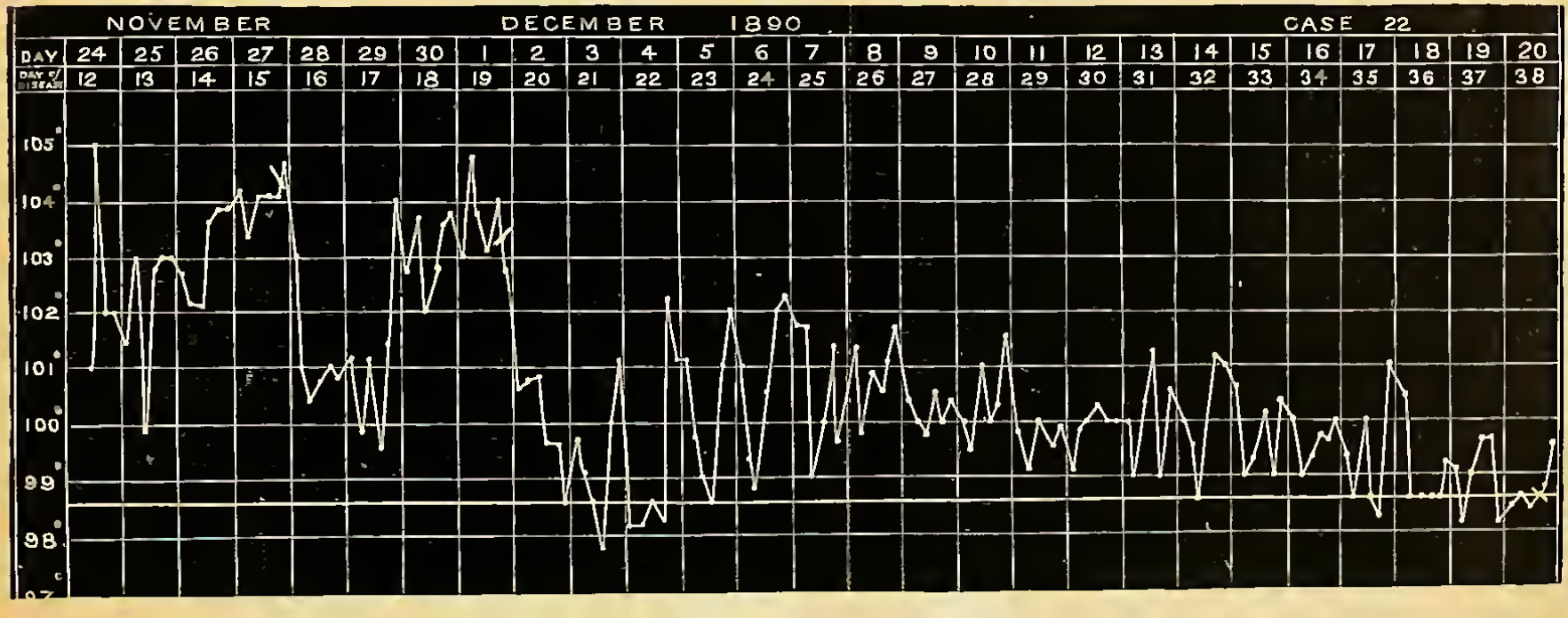
DESCRIPTION OF THE TEMPERATURE CHARTS.

In illustration of the effects of the tank on the temperature two charts are here published. Cases 4 and 22 have been selected, as they were very severe and complicated. The temperatures daily recorded were taken at 4 a.m., 8 a.m., 12 noon, 4 p.m., 8 p.m., and 12 midnight.

Case 4 was put in the tank on the afternoon of the twelfth day of the disease; she was taken out on the twenty-fourth day, and left out for three days. She became much worse, and she was replaced in the tank on the twenty-seventh day. She was then kept in the tank till the thirty-first day, after which convalescence was quickly re-established. The daily exacerbations of temperature during the periods of immersion, chiefly occurred when she was out of the tank while it was being cleaned.

Case 22 had Leiter's tubing with a stream of iced-water applied to his abdomen, from the evening of the fifteenth to the evening of the nineteenth day. During the first two days there was a great fall in the temperature, but it then rose to its former level. On the evening of the nineteenth day he was placed in the tank, and kept in it till the afternoon of the thirty-eighth day. In the tank period the daily exacerbations frequently occurred when he was out of the tank while it was being cleaned; but at other times the tank had not a sufficiently controlling influence over his temperature, and then he received enemata of iced-water, and peroxide of hydrogen.


AUG 1889 SEPTEMBER 1889
CASE 4
DAY 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
DAY OF DISEASE 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
105°
104°
103°
102°
101°
100°
99°
98°
97°


NOVEMBER DECEMBER 1890
CASE 22
DAY 24 25 26 27 28 29 30 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
DAY OF DISEASE 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
105°
104°
103°
102°
101°
100°
99°
98°

CASES TREATED WITH WET-PACKS, ICE-BAGS, COLD COMPRESSES, &c.

CASE 23. *Severe case of Typhoid Fever; Hæmorrhage; Iced Compresses to Abdomen; Cure.*

Genaro E., aged 18, sailor, admitted July 19th, 1890. He is a Spaniard, unable to speak English. He was brought from a Spanish vessel in the ambulance, with the history that he had been ill for a week. He is weak and apathetic. Tongue fairly clean and moist. He has no appetite, and is very thirsty. Motions loose, yellow, neutral, and offensive. Temperature, 101° to 102°. Pulse 96. Respirations 26. Heart and lungs healthy. There are a few rose spots on abdomen which disappear on pressure. Splenic dulness enlarged. No ankle clonus, and knee-jerks not elicited. Ordered four pints of milk daily. Net weight, 106 lb.

July 21st. Urine acid, sp. gr. 1025, albuminous. Ordered boiled bread and milk; 6 grains of β-naphthol, every four hours.

July 26th. Progressing favourably. Urine acid, sp. gr. 1024, no albumen. Temperature ranges from 99° to 102°.

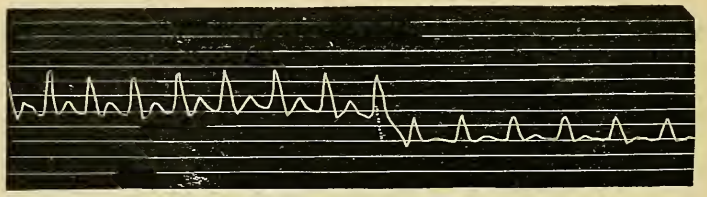
August 2nd (twenty-second day). His temperature has been rarely over 102°, and there is a prolonged daily remission to normal. Urine acid, sp. gr. 1024, no albumen. Bowels rather constipated throughout illness, and had frequent enemata.

August 11th (thirty-first day). This morning there was a severe attack of epistaxis. Pulse, which has only been 60 to 72 for nine days, is now 88. Temperature normal. Urine acid, sp. gr. 1020, no albumen.

August 12th. There has been another severe attack of epistaxis to-day. Pulse 108. Temperature 97°-100°. Ordered ten minims of turpentine, and two grains of caffeine every three hours.

August 13th (thirty-third day). There has been another sharp attack of epistaxis, and severe hæmorrhage from the

bowels. The total loss of blood must have been very considerable, as the patient is now blanched, and there are numerous petechial and small subcutaneous hæmorrhages over the abdomen. Pulse 116, quieter, small, and dicrotic. Temperature 99°-100·6°. Tongue slightly furred and rather dry. He is taking liquid nourishment well. Motions very loose, but not very offensive. Abdomen not distended. Hepatic dulness normal. Splenic dulness 5 by $3\frac{3}{4}$ inches. Heart sounds dull and feeble. No ankle clonus. Knee-jerks can be easily elicited. Ordered iced compresses to abdomen.



G. E., 13-8-90 ; Pulse 124 ; Pressure $2\frac{1}{2}$ and 3 ozs.

August 14th. He slept fairly well after 15 minims of laudanum. Bowels acted freely, motions dark coloured, but no fresh hæmorrhage. Pulse stronger. Purpuric spots more numerous.

August 15th. Bowels acted five times yesterday afternoon and evening, motions dark with blood. He had a starch and laudanum enema: there have been two motions this morning, streaked with blood. Tongue dry. Pulse 96, stronger. No more epistaxis; continue iced compresses.

August 16th. He slept well, and is taking nourishment better. Bowels have not acted for last 24 hours. Tongue dry and furred. Temperature subnormal. Pulse 76.

August 19th. He is much better. No blood in motion since the 15th, and his temperature has been normal since the 14th. Pulse 72. Purpuric spots fading. No ankle clonus, cannot elicit knee-jerks. His temperature ran up to a 100·4° this morning, but afterwards remained normal or subnormal. His bowels have usually been constipated, and he required frequent enemata.

August 26th. Net weight $107\frac{3}{4}$ lb. Ordered fish diet.

August 27th. Up to-day for an hour.

August 30th. Ordered chicken.

September 2nd. Net weight 105¾ lb.

September 3rd. Placed on ordinary diet. ℞ Ferri et Ammon. Cit., gr. x. Potassæ Citrat., gr. xv. Sp. Chloroformi, ♏x. Aq. ad ʒi. To be taken thrice daily after meals.

September 7th. Net weight 110 lb.

September 8th. Discharged to-day quite well.

CASE 24. *Moderately severe case of Typhoid Fever; Hæmorrhage; Iced Compresses to Abdomen; Cure.*

John Francis R., aged 19, labourer, admitted to hospital September 8th, 1890. His present illness began about three weeks ago with diarrhœa, but although he felt ill, he continued at work till four days ago, when he took to bed and remained there until to-day, when he walked a short distance to the Stanley Hospital, where he was seen by Dr. Bradshaw, who diagnosed typhoid fever, and sent him here under my care. His temperature on admission was 102·6°, and rose at midnight to 104·4°. Ordered four pints of milk, and peptonised bread and milk.

September 9th. Tongue furred but moist. There is considerable diarrhœa; motions liquid, alkaline, and brownish. Pulse small and weak. Heart's sounds clear. He has a slight cough, but no expectoration. There are a few cooing rhonchi all over the chest; spleen enlarged; abdomen rather tense and distended, and tender over the lower part. Knee-jerks present; no ankle clonus. Net weight 106 lb.

September 10th (twenty-third day, approximately). He had a drachm of bromidia, but slept badly, and was very restless. He had ten motions yesterday, and during the night there was very free hæmorrhage from the bowels. He had an enema of starch and laudanum, and was ordered 15 minims of oil of turpentine, every three hours. Tongue dry and furred. Pulse 96, small, weak and soft. Ordered iced compresses to abdomen, which is tense and distended. Temperature this morning fell to 99°, but rose in the evening to 102·8°. He

had fifteen loose motions to-day, but after the sixth there was no blood.

September 11th. At 10.45, last night, he had a starch enema, with 15 minims of laudanum; but he was very restless till 2 a.m., when he had 15 minims of nepenthe. He then slept till 6 a.m. Motions brownish, watery, and alkaline; Tongue very dry; abdomen quite flat. Continue iced compresses. There were marked evening exacerbations of temperature, with remissions in the morning to nearly normal, until September 19th.

September 23rd. Net weight 96 lb. ℞ Caffeinæ, gr. ii. Tinct. Cinchonæ Co., ℥xxx. Aq. Chloroformi ad ℥i. To be taken every fourth hour.

September 27th. Beef tea, fish, and rice.

October 4th. Chicken.

Net weights: Setember 30th, 98 lb.; October 13th, 109 lb. Discharged on this day quite well.

CASE 25. *Typhoid Fever; Wet-pack for 5 days; Cure.*

Annie R., aged 6 years, (child of case 21), admitted to hospital October 1st, 1890. She is a delicate-looking poorly nourished child, suffering from typhoid fever of nine days duration. Temperature 103°. Ordered 3 pints of milk, and peptonised bread and milk.

October 2nd (fourth day). Net weight 39¼ lb. She had four loose alkaline motions to-day. ℞ Bismuthi subnitrat., gr. v. β-naphthol, gr. v. Fiat pulv. Sig.: One every four hours.

Her temperature steadily declined from 103°, on night of admission, to 96·4°, at 4 and 8 in the morning of the 3rd. Her temperature rose to 101·2° on the eleventh day, and 102·8° on the twelfth day. She was then placed in the wet-pack, which was continued for two days. On the sixteenth day her temperature had again become subnormal, and there was well-marked ankle clonus. On the twenty-first day she weighed 40¼ lb. Her temperature remained normal from the 16th to the 23rd, when there was a rise to 101°, and the febrile move-

ment between 99° and 101° continued for four days. On the twenty-fourth day the wet-pack was resumed, and continued till the twenty-seventh day. On the thirty-second day she weighed only 37¾ lb. From this time the improvement was uninterrupted. On October 26th (thirty-fourth day), she got fish diet; and on October 27th, ordinary diet. On October 31st she weighed 41 lb., and she was discharged quite well on November 4th, 1890.

CASE 26. *Prolonged case of Typhoid Fever; Wet-pack; Cure.*

Thomas J., aged 22, sailor, admitted to hospital October 7th, 1890. His present illness began in Roumania, about a month ago, and he ascribes it to drinking the Danube water. He has suffered from severe diarrhœa, from twelve to fifteen motions each day, since his illness began. He was treated by the Captain of the vessel with diarrhœa mixture. He is a well developed man but now much emaciated, very weak, and anæmic. Temperature on admission 100°, and in the evening 101°. Pulse 104. During the first 24 hours he had eleven loose, alkaline, and very offensive motions. Tongue moist and pale; mucous membranes very anæmic; pupils dilated. Heart's sounds dull and feeble; lungs healthy. Splenic dulness 6 by 4 inches. Net weight 128½ lb. Ordered milk diet: ten grains of β-naphthol, every four hours.

His temperature for the first five days usually ranged from 99° to 101°, the highest being 102° in the evening of October 11th. From this time it remained normal, and his condition improved until the 21st, when there was a rise of temperature. On the 17th he was placed on ordinary diet, and got a mixture of caffeine and cinchona. On the 22nd he was ordered ten grains of quinine. On the 23rd, when his temperature reached 101°, he was placed in the wet pack. This was discontinued in three days when his temperature became normal. On November 1st he was ordered two ounces of butter. On November 3rd he had a slight rigor (during which his temperature reached 101°), followed by profuse sweating. He got four grains of quinine every four hours. From this time

his temperature remained normal. He had several doses of calomel during his illness. His net weight was, on November 3rd, 129 lb.: 7th, 131½ lb.; 14th, 140½ lb. Discharged November 17th, quite well and strong.

CASE 27. *Severe case of Typhoid Fever; Wet-pack for eleven days; Cure.*

Robert B., aged 25, packer, admitted October 16th, 1890. This patient was sent in by Dr. G. G. Stopford Taylor, from whom I got a full account of the history of the case, of which the following is a brief abstract. About the middle of August the patient suffered from a severe attack of coryza accompanied by a troublesome cough. A few days after the commencement of his illness he bathed in the Dee; this was followed by suppurative inflammation of left middle ear with rupture of the membrana tympani, and a very free discharge of blood and pus. The right ear was also affected, but there was no suppuration. On August 20th he visited St. Paul's Eye and Ear Infirmary, and after a time his ears got gradually better. Once or twice during this illness he passed a quantity of blood per rectum. His temperature, however, was never high, and generally about normal. He continued very weak for some time, complaining of indefinite pains, slight headache and earache. About three weeks ago he improved so much that he was advised to go to the convalescent home at Woolton. He did well there for the first ten or twelve days, but the day before leaving (Thursday) he felt pains in the limbs and abdomen, and was very shaky. He ascribed this to having caught cold, as he was unable to keep himself warm in bed.

On Friday, October 10th, he called on Dr. Taylor, and on the 11th, took to bed. He complained principally of severe headache, pains in the abdomen and limbs. He also passed a little blood per rectum. Temperature 103°. On Sunday and Monday he felt much about the same, headache, pains in all his limbs and back. Sometimes he felt rather chilly, and at others was sweating profusely. Temperature 103° to 104°.

On Tuesday there was severe hæmaturia, and he was sent to hospital on Thursday, October 16th.

On admission he was very prostrate, face dusky, anxious expression. Eyes dull, pupils dilated; skin hot and dry, temperature 103°. Tongue moist, coated with a thick white fur, tremulous. Pulse soft and compressible. Slight cough with scanty expectoration. Bowels constipated; urine acid, sp. gr. 1017, contains albumen and blood. Ordered 4 pints of milk and 12 ozs. of bread. Calomel 4 grains.

October 18th (tenth day). Temperature 103°-104°. Pulse 100-112. Motions loose, yellow, and alkaline. Urine neutral, sp. gr. 1020, albumen and blood, with Ehrlich's test gave a bright red colour. Ordered 10 grains of periodate crystals every four hours. Net weight 124 lb.

October 21st. Mean temperature since last note 103·2°. Pulse 96. Respirations 36. Urine alkaline, sp. gr. 1015, no albumen and no blood. Motion loose. Placed to-day in wet-blanket.

October 24th. The wet blanket has had very little effect on the temperature, and to-day it is changed for a wet-sheet.

October 26th. He did not sleep well. Tongue very dry. Pharynx and tonsils dry and glazed, he has almost lost his voice. His temperature has been about a degree lower since wet-sheet was adopted (101°-103·6°). Pulse 96. Dry rhonchi heard all over chest. He takes liquid nourishment well.

October 31st (twenty-third day). This patient's condition since last note is fairly indicated on the temperature chart. He has been rather listless, but often expresses dislike for the wet-pack. His tongue has been rather dry, brown, and slightly fissured. Bowels moved about once daily. No headache. He does not sleep well. There is no distension of the abdomen. Splenic dulness 6 by $4\frac{3}{4}$ inches. Heart sounds dull. Respirations 18; loud, sonorous rhonchi all over chest. Well marked ankle clonus, and exaggerated knee-jerks. Body much emaciated.

November 1st. Temperature has fallen to normal. He is much troubled with vomiting. Ordered an alkaline mixture. Discontinue wet-pack, and clothe lightly.

November 2nd. Sickness less. Temperature normal. Pulse 104. Respirations 22.

November 7th. Temperature has been normal for three days. Pulse 92. Bowels rather constipated, and lately he has had several doses of calomel. Net weight 108 lb. He has lost 16 lb. in 20 days. Ordered fish diet. ℞ Caffeinæ, gr. ii. Tincturæ Cinchonæ Co., ♏xx. Aq. Chloroformi, ad ℥i. Every four hours.

November 14th. Net weight 111 lb.

November 23rd. Net weight 118 lb.

November 26th. Knee-jerks are well marked. Ankle clonus has disappeared.

December 13th. Discharged quite well.

CASE 28. *Severe case of Typhoid Fever; Basilar Meningitis; Double Otitis Media; Nineteen days in Wet-pack; Fed by Nostril for twenty-three days; Cure*

This case was very interesting, not merely on account of its severity, and the recovery of the patient, but also from a diagnostic point of view. The problem presented to my mind, and to the others who saw him, was, is it a case of typhoid fever or of tubercular meningitis? That basilar meningitis had developed in the course of the illness was fairly established by the irritability and hyperæsthetic condition; the retraction of the head; the gradually increasing difficulty in swallowing, with eventual impossibility to do so; the tonic contraction of the muscles, and the loss of the knee-jerks. The condition of the lungs was such as might be expected in either typhoid fever or tuberculosis, but no tubercle bacilli were found in the vomited matter, part of which was evidently bronchial mucous. The previous history of fourteen days illness with diarrhœa, the character of the motions, the enlargement of the spleen, and the fact that the urine gave a deep purple reaction with Ehrlich's test showed the presence of typhoid fever. The complete recovery of the patient eradicated all tuburcular ideas from our mind, and finally left us with the diagnosis stated above. Whatever difference of opinion there may be as to the nature of the case, there can be none as to its severity.

James V., aged seven years, admitted to hospital November 3rd, 1890. His mother states that he has been ill about a fortnight, and for the last week he has been confined to bed. He has had diarrhœa, and for a few days has been attended by a medical man, who reported the case as one of typhoid fever.

On admission he was in a very weak, emaciated condition, and following day only weighed 33 lb. Face pale and shrunken. Pupils dilated. Tongue fairly clean and moist; he cannot protrude it well, but tries to do so when requested. Sordes on lips and teeth. He is irritable and very fretful; will not answer questions. Temperature 102·6°. Pulse 148. Ordered 4 pints of milk and 6 ounces of bread. ℞ β-naphthol, gr. iv. Every four hours.

November 4th (fifteenth day). He slept fairly well. He is passing urine involuntarily. Bowels acted after an enema; motion loose, bright brown, and offensive. Heart's sounds clear. Respiratory murmur harsh, but it is rather difficult to auscultate, owing to his constant whining. Lung percussion clear. Splenic dulness increased. No abdominal distension, and apparently no pain on pressure, as he does not wince. Knee-jerks present, but not well marked. There is now a malar flush. Pulse 142, small and weak. Temperatures to-day, 4 a.m., 102·6°; 8 a.m., 103°; noon, 101·8°; 4 p.m., 103·8°; 8 p.m., 100·2°; midnight, 103°. He was put in the wet-pack at 6 p.m.: the effect on his temperature was soon noticeable, though, as noted, there was a rise at midnight.

November 5th (sixteenth day). He did not sleep at all, but whined all night, and kept the other patients awake. He took his milk freely but would not swallow any boiled bread and milk. He is very fretful and irritable. Commences to cry when anyone goes near him. He will not put out his tongue. Pulse 160, quick, small and weak. He passes urine involuntarily. Head retracted, and at present legs extended. The nurse says he usually lies on his side with thighs flexed on abdomen, and legs on thighs. Knee-jerks present; left most marked. Temperature to-day 99·8° to 102°. Bowels not moved. ℞ β-naphthol, gr. iv. Pulv. Ipecac. Co., gr. iv.

Fiat Pulv. Sig.: One every four hours. Calomel two grains.

November 6th. He got three powders, the last at midnight, and he slept well after 1 a.m., so the powders were not repeated during the night. He only took eight ounces of milk during the night, and had great difficulty in swallowing. Bowels moved freely this morning after an enema. Motion loose, yellow, acid, and offensive. He seems quite unable to swallow, and it is now directed that he be fed through a fine tube, passed down through the nostril into the gullet. Pulse 152. Temperature, 4 a.m. to 4 p.m., 100° to 101°; 8 p.m., 103·4°; midnight, 102°. Urine and fæces passed involuntarily.

November 7th. He slept fairly well. It is directed to put the naphthol and pulv. ipecac. co. in separate powders, so that he may have the former every 4 hours, and the latter as often as required. Temperature, to-day, 99·2° to 102°. Pulse 160. He slept from 4 to 10 p.m.

November 8th (nineteenth day). He was very restless until 3 a.m., and afterwards slept quietly. At 10-30 a.m. he vomited. Whenever the pack is changed he flexes his thighs and legs, and the nurse has some trouble in straightening them. His body is very rigid, and head retracted. He is unable to swallow, and is very irritable. Knee-jerks present; no ankle clonus; pulse 164, small, soft, quick, and weak. He is troubled with cough; breath sounds very harsh. Expectoration and vomited matters examined for tubercle bacilli, but none found. Tongue moist, coated with whitish fur. Sordes on lips and teeth. Urine passed involuntarily, but a little was saved and examined with the following result: sp. gr. 1010, alkaline, small quantity of albumen, and with Ehrlich's test gave a deep ruby colour. One motion, partly formed, yellow, and very offensive. Temperatures, 102°, 99·8°, 99·6°, 103·2°, 101·6°, 101°.

November 9th. He was rather better, and not so irritable this morning. Pulse 136. Temperature, 4 a.m., 102°; 8 a.m., 98·8°; noon, 98·6°; 4 p.m., 99°. He had a loose, yellow, offensive, and alkaline motion this afternoon. At 8 p.m. his

temperature ran up to 103°, and remained at that level to midnight. Pulse 160. He had the naphthol and Dover's powders regularly.

November 10th. He slept fairly well, and received 27 ounces of milk during the night. No motion to-day. Pulse 160. Temperatures, 102°, 99°, 99°, 101·4°, 99°, 100°.

November 11th (twenty-second day). Two motions, yellow, formed, and alkaline. Pulse 156. Temperatures, 100°, 98·6°, 98·6°, 100°, 98·6°, 99·6°.

November 12th. He had a very good night, and received 30 ounces of milk. Temperature 98° to 100°. Pulse 152. No motion. Three grains of calomel.

November 13th. He was rather restless last night. Received 30 ounces of milk through the nostril. Pulse 152. There is a fœtid purulent discharge from both ears; syringed with solution of boracic acid. One loose, light yellow, alkaline motion. Urine neutral, sp. gr. 1016, slightly albuminous. Both fæces and urine passed involuntarily. Temperatures, 99·8°, 98·6°, 98°, 98°, 98·8°, 101°.

November 14th. Slight discharge from both ears; syringed, and dressed with powdered boric acid. Temperatures, 100°, 99·6°, 101·6°, 101·2°, 99·8°, 102°. No motion.

November 15th. He did not sleep well. Received 30 ounces of milk through nostrils. Knee-jerks absent, no ankle clonus. One greenish motion after an enema. Pulse 160. Temperatures, 99·8°, 100°, 98°, 97·6°, 99·4°, 99·6°. Discharge from ears stopped.

November 16th (twenty-second day). Crepitant râles audible all over back of chest; expiration prolonged, some dulness in percussion all along vertebral grooves. Ordered two ounces of butter, and malted milk daily. One alkaline, light yellow, offensive motion. Pulse 136. Temperatures, 100°, 100°, 98·6°, 99·8°, 101·2°, 103°.

November 17th. Knee-jerks present, no ankle clonus, numerous moist râles heard all over chest, and tubular breathing at back, dulness increased. One offensive motion. Pulse 164. Temperatures, 103·4°, 100°, 101·4°, 102·4°, 100°,

99°. ℞ β-naphthol, gr. iv. Pulv. Ipecac. Co., gr. iv. Quininæ Sulph., gr. ss. Pulv. Digitalis foliæ, gr. $\frac{1}{6}$. Fiat Pulvis. Sig.: One every four hours.

November 18th. He had four powders and slept very well. He received through nostrils two pints of milk, to which malted milk, and melted butter had been added. He coughs less. No motion. Pulse 140. Temperatures, 99·2°, 99·6°, 101·2°, 99°, 98°, 99°. Calomel 3 grains.

November 19th. Received, during night, two pints of liquid nourishment, consisting of milk, Benger's food, malted milk, and butter. Slept well. Two loose, yellow, offensive motions. No discharge from ears. There is a bed sore forming at lower part of back, and one on right heel. He was placed on a water-bed yesterday afternoon. Temperatures, 100°, 98°, 97·6°, 97·6°, 98·8°, 99·2°. Pulse 144.

November 20th. He had six pints of liquid nourishment during last 24 hours. Temperature 97° to 99°. No motion. Three grains of calomel.

November 21st. Temperature 97·2° to 99·8°. One motion.

November 22nd. He passed a restless night. Dr. Askin was called to see him at 4 a.m., and found him very collapsed. Temperature 97·2°. Pulse imperceptible at wrist. He was taken out of wet-pack and hot bottles applied. He soon rallied and at 10 a.m. pulse 160, temperature 101°. The wet-pack was then resumed, He took five pints of liquid nourishment during last 24 hours; it consisted of milk, Benger's food, malted milk, isinglass, and butter. No motion yesterday or to-day. Temperature 98° to 99·6°. The wet-pack is now discontinued.

November 24th (thirty-fifth day). Net weight 29¾ lb., thus showing a loss of 3¼ lb. He is very fretful, cries when touched, but does not speak. He has not spoken since his admission to hospital. Tongue dry and coated with a brownish fur. He has still to be fed by nostril. Pupils dilated, the retraction of the head has disappeared. The muscles of the extremities are in a state of tonic contraction; the arms are drawn close to the sides, and the forearms flexed on the arms; his lower limbs are extended and much wasted, and muscles

rigidly contracted. Any attempt to test for knee-jerks or ankle clonus causes great pain. Temperature 97° to 99°.

November 26th. Knee-jerks present on left side, absent on right. His forearms are acutely flexed on arms and difficult to extend. Tongue moist. He takes a fair amount of nourishment through the nostril. Pupils dilated, face flushed. The sores on the back are healing, a large sore on right heel is sloughing; there is slight discharge from right ear. Temperature 98°. Urine alkaline, slightly albuminous.

November 27th. Butter is now increased to four ounces daily.

November 29th. He took a feeder of milk by the mouth this morning for the first time.

November 30th. Weight 32¾ lb. Temperature normal

December 2nd. He is more intelligent. Put out his tongue to-day for the first time when told to do so. Ordered one ounce of malt extract.

December 6th. Net weight 36¼ lb. He began yesterday at noon to eat bread and butter, and now takes it with avidity. He is quite intelligent, and does what he is told, but he has not yet spoken. The discharge from the ears has ceased, and the sores on the sacrum and right heel are healing. Tongue clean and moist, appetite fair, bowels constipated except when moved by aperients. The flexor muscles of the forearms and legs are still contracted.

December 10th. He has spoken to-day for the first time.

December 12th. One egg.

December 15th. Net weight 40 lb.

December 26th. Net weight 42 lb. Knee-jerks still absent.

January 2nd. Net weight 46 lb. Ordered fish diet.

January 7th. Net weight 49 lb.

January 14th. He has considerable difficulty in walking, and his gait is characteristic of paresis of the extensor and peroneal muscles, but all the muscles respond to the Faradic current. Ordered massage and the Faradic current.

February 9th, 1891. Net weight 50 lb. He was discharged to-day quite well, fat, and strong.

CASE 29. *Severe case of Typhoid Fever; Ice-bag to Abdomen for six days; Leiter's tubing for six days; Cold Water enemata; Cure.*

William S., age 10, admitted to hospital November 6th, 1890. Illness began two weeks ago with headache, and for the last week he has been confined to bed. He is a bright, intelligent lad, but rather fretful. He is emaciated, eyes bright, pupils dilated. Temperature 102°. Pulse 128, soft, weak, and dicrotic. Respirations 18. Numerous dry rhonchi heard all over chest. Cardiac sounds normal. Tongue moist, but rather glazed. Sordes on lips and gums. No abdominal distension. Spleen enlarged. Pain in right iliac fossa on firm pressure. No typhoid spots visible. Knee-jerks well-marked; ankle clonus present on both sides.

November 7th (fifteenth day). Bowels acted this morning after an enema; motion loose, yellow, and acid. Urine acid, slight albumen. Net weight 52¼ lb. Ordered 4 pints of milk and 8 ounces of bread daily. Temperature, 100° to 103°.

November 8th. One loose, yellow, alkaline motion. Urine alkaline, sp. gr. 1020, no albumen, deposit of triple phosphates and urates, with Ehrlich's test gave a very characteristic deep ruby-coloured reaction. Pulse 124. Temperature, 100° to 103°; mean 101·75°. Ordered 6 grains of β-naphthol, every four hours.

November 9th. He slept very well. He does not like the boiled bread and milk, so Benger's food is substituted. Pulse 120. Temperature, 101°-103°; mean 102·2°. No motion.

November 10th. He slept well. Pulse 128. Temperature, 101°-103·4°; mean 102°. After an enema, motion loose, bright yellow, offensive, and acid. Ordered 2 grains of calomel.

November 11th (nineteenth day). He sleeps very well. Pulse 124. Cough easier; there are still some bronchitic râles. Tongue clean and moist. Knee-jerks and ankle clonus well marked on both sides. Temperature, 101°-103·6°; mean, 102·5°. No motion. 2 grains of calomel.

November 12th. After an enema, motion loose, bright yellow, alkaline, and very offensive. Pulse 116. Temperature,

100°-103·4°; mean 101·5°. Spleen can be felt underneath the ribs.

November 13th. Urine acid, sp. gr. 1025, no albumen. Pulse 128. Temperature, 101°-103·6°; mean 102·7°. No motion. He received 3 grains of calomel, and afterwards 2 grains.

November 14th. After an enema, two loose motions, bright yellow, acid, and offensive. Pulse 120. Mean temperature, 102·3°.

November 15th (twenty-third day). One motion partly formed, yellow, and alkaline. Temperature, 101°-104°; mean 102·5°. Two grains of calomel. Ice-bag applied to abdomen.

November 16th. After enema, one loose alkaline motion. Temperature, 99·8°-104°; mean 101·7°. Pulse 120.

November 17th. Slept well. Temperature, 99·2° to 103°; mean 101·3°. No motion.

November 18th. Loose alkaline motion after enema. Pulse 128. Temperature, 101°-103·8°; mean 102·5°.

November 19th (twenty-seventh day). Two motions, after 3 grains of calomel. Pulse 128. Temperature, 101·8°-104·2°; mean 103·1°. When the temperature reached its maximum he received an enema of 15 ounces of iced water, and 5 ounces of peroxide of hydrogen (10 vols. strength). Knee-jerks and ankle clonus pronounced. Spleen much enlarged.

November 20th. His temperature steadily fell after the iced-enema last night, and by midnight it was 102°, and at noon, to-day, it was only 100°. At 4 p.m. it rose to 102°, and he had then another iced-enema, and at 8 a.m. it was 100·6°. Two loose motions. Abdomen rather retracted.

November 21st. One loose light yellow, acid, offensive motion. Pulse 112. Temperature, 99·8°-101°. Leiter's tubing with iced-water, substituted for ice-bag.

November 22nd. He slept well, and is taking nourishment well. Temperature, 100°-101·8°; mean 100·4°. Pulse 120. One motion.

November 23rd. Pulse 112. Temperature, 98·6°-100°. No motion.

November 24th (thirty-second day). Temperature, 97°-99·8° mean 98·2°. One motion. Net weight 55 lb. Knee-jerks and ankle clonus well-marked.

November 27th (thirty-fifth day). Pulse 112. Temperature normal for last three days, with a slight evening rise. Leiter's tubing discontinued. Pulse 112. No motion to-day.

November 29th. Knee-jerks and ankle clonus still well-marked. Pupils widely dilated. Tongue fairly moist and slightly furred. Stop naphthol. ℞ Ammon. Carb., gr. iii. Tinct. Cinchonæ Co., ♏xx. Caffeinæ, gr. ii. Aq. Chloroformi, ad ʒi. Every four hours.

December 1st. Net weight 50¼ lb. Temperature normal. Bowels usually confined, and he has had an occasional dose of calomel. Pulse 92.

December 3rd. Pulse 76. Knee-jerks and ankle clonus still well-marked. Spleen cannot be felt, but it is still enlarged.

December 11th. Net weight 57¼ lb. Fish diet.

December 19th. Net weight 64 lb.

December 26th. Net weight 66½ lb.

January 1st, 1891. Net weight 71 lb.

January 4th. Discharged quite well and strong.

CASE 30. *Severe case of Typhoid Fever; Wet-pack for twenty days; Ice-bag to Abdomen; and cold water enemata; Cure.*

Maud G., aged 6 years, admitted to hospital November 6th, 1890, on the seventh day of illness. She is a fairly healthy looking child, with flushed face, bright eyes, and dilated pupils. Tongue moist, furred and transversely fissured. Pulse 128. Respirations 36. Temperature, 104·2°. Abdomen distended and tympanitic; splenic dulness increased. There are a few lenticular rose spots on chest and abdomen, and on the back there are numerous rose spots which disappear on pressure. Knee-jerks present, no ankle clonus. Heart and lungs healthy. Ordered two pints of milk and six ounces of bread.

November 7th (eighth day). She slept well. Temperature, 4 and 8 a.m., 102·6°; noon 103·2°; she was now placed in a wet-

sheet, and at 4 p.m. her temperature had fallen to 101·2°; but at 8 p.m. it was 103·4°; and at midnight, 103°. She took nourishment badly. Two loose yellow alkaline motions.

November 8th. She slept fairly well last night and took nourishment better—about 28 ounces of milk. Two loose yellow alkaline offensive motions. Pulse 156, small and weak. Tongue clear and fairly moist. Temperature, 4 a.m., 102·8°; 8 a.m., 103·6° in rectum. (From this time till December 3rd, all the temperatures recorded were taken in the rectum); noon, 103·8°; 4 p.m., 102·8°; 8 p.m., 103·2°; 12 a.m., 103·6°. Net weight, 31½ lb.

November 10th. She did not sleep well, and only took one pint of milk, and that with reluctance, during the night. Pulse 160. Tongue fairly moist and clean. Temperature keeps high, 103°-104°. Two loose yellow alkaline motions daily. Ordered 4 grains of β-naphthol, every four hours.

November 11th. Temperature, 4 a.m., 101·2°; 8 a.m., 104·8°; noon, 104·2°. In addition to the wet-pack an ice-bag was now applied to her abdomen, and by 8 p.m. her temperature had fallen to 101°. Pulse 154. She had 2 grains of calomel, and she passed three loose, yellow, very offensive, alkaline motions.

November 12th. Temperature to-day, 102°-104·2°; mean, 103°. Pulse 136. Two motions.

November 13th. She slept fairly well last night, and during last 24 hours took 55 fluid ounces of milk. Tongue clean and moist. Pulse 132-140. Knee-jerks present. No ankle clonus. One motion. Abdomen is not now distended. Many rose spots still visible. Temperature 102·2°-104·8°; mean, 103°. Two grains of calomel. Ordered Benger's food and milk in place of bread.

November 14th. Tongue clean and moist. Eyes bright. Pupils dilated. Cheeks flushed. Her temperature dropped this morning to 99·4°, and the ice-bag was discontinued. Her temperature rose at 4 p.m. to 103·2°, but fell at midnight to 100·4°.

November 15th. Temperatures, 4 a.m., 105·4°; 8 a.m., 102·2°; noon, 103°; 4 p.m., 102°; 8 p.m., 102·2°; 12 a.m., 103·6°. Two motions. Pulse 148.

November 16th. Takes her milk with great reluctance. There are numerous moist râles all over back of chest. Pulse 128. Respirations 50. Temperatures, 4 a.m., 100·4°; 8 and 12, 102°; 4 p.m., 104·2°; 8 p.m., 104°. Ice-bag to abdomen resumed; midnight, 101·4°. Two alkaline motions.

November 17th. Temperature, 4 a.m., 98·4° (ice-bag removed); 8 a.m., 99·4°; noon, 103° (ice-bag renewed); 4 p.m., 104·8° (vomited); 8 p.m., 103·2°; midnight, 101·2°. Four motions, loose, yellow, and acid reaction. Pulse 156.

November 18th Temperature 4 a.m., 99·2° (ice-bag removed); 8 a.m., 102·2° (ice-bag repeated); noon, 101·4°; 4 p.m., 101·2°; 8 p.m., 104°; midnight. 101·6°. Pulse 144. Two loose yellow acid motions.

November 19th. Temperature, 4 a.m., 100°; 8 a.m., 99·2° (ice-bag removed); noon, 102·2° (ice-bag repeated); 4 p.m., 100·8°; 8 p.m., 103° (iced-enema, which was only retained a short time). Three loose motions, second acid, and third alkaline. Vomited to-day.

November 20th. Temperature, 4 a.m., 99·6°; 8 a.m., 99·2°; (ice-bag removed); noon, 104°; (ice-bag renewed); 4 p.m., 100·4°; 8 p.m., 99°; midnight, 100·2°. Pulse 168. Respirations 60. Four loose, dark, offensive motions, third and fourth tested and found acid. Vomited this afternoon.

November 21st. Temperature, 97·8°-100°. Pulse 124; one loose, light yellow, acid motion.

November 22nd. Temperature, 98·4° to 100·6°. Pulse 124. Three pale yellow, alkaline motions.

November 23rd. Temperature, 98·8° to 102°; mean 100°. Pulse 144. Respirations 34. Vomited twice. Two yellow formed motions, first acid, second alkaline.

November 24th. Temperature, 97·8° (ice-bag removed); 8 a.m., 99·6° (ice-bag repeated); noon, 99·2°; 4 p.m., 99·6°; 8 p.m., 100·2°; midnight 99·8°. Pulse 128. Two acid motions.

November 26th. Temperature 98·8° to 99·6°. Ice-bag finally stopped. Pulse 128. One acid motion yesterday, and to-day. Net weight 29¼ lb.; loss in eighteen days 2¼ lb.

November 27th. Pulse 128. Temperature normal, wet-pack

finally discontinued, and her temperature afterwards ran up to 100·2°, but again soon declined. Ordered 2 ounces of butter daily. The breath sounds are fairly normal, a few rhonchi can be heard at back of chest. Knee-jerks well marked, no ankle clonus.

December 1st. There has been an evening rise of temperature of a degree and-a-half, since last note. Breath sounds on front of chest are harsh, and there are a few rhonchi; and at base of right lung there are a few crepitant râles. Naphthol stopped. ℞ Quininæ Sulph., gr. i. Caffeinæ, gr. i. Acidi Hydrobrom. dil., ℥v. Syrupi, ʒss. Aq. Chloroformi, ad ʒss. Thrice daily.

December 3rd. Temperature normal, now taken in the axilla. Pulse 116.

December 5th. Net weight 29 lb. Mutton broth.

December 12th. Net weight 32 lb. Fish diet, and buttered toast

December 16th. Allowed up on couch for the first time

December 19th. Net weight 32 lb.

December 26th. Net weight 35¼ lb.

January 1st. 1891. Discharged quite well.

CASE 31. *Severe case of Typhoid Fever; Ice-bag to the Abdomen; Cure.*

Isabella B., aged 10, admitted to hospital December 8th, 1890. This patient was very prostrate on admission, and apparently unconscious. She lay curled up in bed with her knees drawn up nearly to her chin. She could not be got to answer any questions, but lay in a somnolent condition, occasionally waking up with a low moan, and then quietly lapsing into an apathetic drowsy condition. Her mother stated that she had been ill fifteen days prior to admission.

She is a poorly nourished child, with a pale, emaciated appearance. Skin hot and dry. Tongue dry. Lips and teeth covered with sordes. She passes urine and fæces involuntarily. Motions loose, pale yellow and alkaline. The breath sounds are harsh, and there is a good deal of hacking cough. Respirations 38. Pulse 148, small and feeble. Spleen enlarged.

Knee-jerks not elicited. Ankle clonus slightly marked on right side. Net weight, 35 lb. Ordered 3 pints of milk, 8 ounces of bread, and 2 ounces of butter. Six grains of naphthaline every four hours. Her temperature was 102° on admission, and steadily rose, till the following evening it was 104·4°. An ice-bag was applied to the abdomen, which in 12 hours brought down the temperature to 98°. She then became more conscious. Put out her tongue, which was very dry and fissured. The percussion at the bases of both lungs was impaired, and there were rhonchi.

December 11th. Bowels acted freely and involuntarily. Motions alkaline and offensive. Pupils dilated. Tongue very dry and fissured. Knee-jerks, present. No ankle clonus. Pulse 144. Respirations 42. Temperature 100° to 102·4°. Ice-bag continued. Benger's food and extract of malt.

December 13th (twenty-first day). She had a good night. Bowels acted twice involuntarily. Tongue hot and dry. She is coughing less. There are numerous small crepitant râles over lower lobes of both lungs. Percussion note impaired, especially over right lower lobe. Respirations 36. Pulse 158, small, but moderately firm. Knee-jerks well marked. No ankle clonus. Temperature fell this morning to normal and afterwards remained so. Ice-bag stopped on the 14th. Her urine was saved on December 15th, and it then gave Ehrlich's reaction, well marked.

On December 17th, she weighed 40 lb.

December 23rd, fish diet. Naphthaline stopped, and given a mixture of caffeine and cinchona. December 27th; net weight, 42 lb. January 2nd; net weight, 42 lb.; 9th, 46 lb.; 14th, ordinary diet and one egg; 16th, net weight, 48 lb. Discharged January 20th, 1891, quite well.

CASE 32. *Typhoid Fever; Ice-bag applied to the Abdomen for thirteen days; Cure.*

Mary E. J., aged eleven, admitted January 27th, 1891, on the sixth day of illness. She has at present two brothers and one sister in this hospital suffering from typhoid fever. She

has always been a delicate girl. She took ill on the 22nd instant with pain in the back and abdomen.

She is a spare delicate looking child, net weight 54 lb. Face pale, with malar flush, eyes bright, pupils dilated. Tongue moist, coated in the centre with a greyish white fur, tip and edges clean, papillæ prominent, sordes on lips and teeth. Appetite bad; bowels confined. Lungs healthy. Heart's sounds clear, second sound accentuated at pulmonic cartilage. Splenic dulness increased, abdomen not distended nor tender on pressure No typhoid spots. Knee-jerks present, no ankle clonus. Temperature 103°. Pulse 108. Urine acid, sp. gr. 1028, no albumen, urea 3·5 per cent, deposit of urates, and gives Ehrlich's reaction. Ordered 4 pints of milk, and 6 ounces of bread daily; 10 grains of salol every 4 hours.

There were marked fluctuations of temperature in this case throughout, the daily range being about four degrees. On the thirteenth day the ice-bag was applied to the abdomen and continued to the twenty-fifth day. She was also frequently sponged with cold water when the temperature rose to 104°. Her bowels were rather confined throughout, and she had several doses of calomel, and enemata. On nineteenth day ordered 2 ounces of butter daily. Her temperature became normal on the twenty-fourth day. Twenty-sixth day, net weight 49 lb., showing a loss of 5 lb. during twenty days in hospital.

February 17th. Stopped salol, and put on a mixture of bark and caffeine.

February 21st. Ordered fish diet.

February 26th. Net weight 54 lb. Put on ordinary diet, one pint of milk, and an egg.

March 3rd. Net weight 56 lb.

March 5th. Discharged quite well.

CASE 33. *Severe and prolonged case of Typhoid Fever; Ice-bag applied to the Abdomen for twenty-two days; Wet-pack for seven days; Cure.*

Jane M, aged 18 years, admitted to hospital January 10th, 1891. She has been married two years, and about 7 months

ago she was prematurely confined of a child, who lived 8 weeks. At the end of last month she had an abortion of nine weeks gestation, from which she had not recovered when the present illness began on New Year's Eve. Since then she has felt miserable and weak, but did not take to bed until the day before admission. For the last two days she has suffered from diarrhœa, though previous to that her bowels were confined. There is still some discharge of blood from uterus. She is now very deaf and stupid, but answers questions intelligently, and there is no delirium. Her face is flushed, eyes bright, pupils dilated; tongue dry and fissured; lips and teeth coated with sordes; motions acid, loose, light yellow, and offensive. Heart's sounds clear. Pulse 128, soft and dicrotic. She lies chiefly on her right side, and there is impaired percussion at base of right lung. Respirations 44, shallow. Hepatic dulness normal; splenic dulness increased. Her abdomen is not distended. There is tenderness, but no gurgling in right iliac fossa. Over chest and abdomen there are several distinct elevated rose spots, which disappear on pressure. Knee-jerks present, but not much marked; no ankle clonus. Temperature, 102·6° to 103·6°. Ordered 4 pints of milk and 8 ounces of bread daily; 10 grains of β-naphthol every four hours.

January 12th (thirteenth day). She had a fair night, after a dose of nepenthe. The diarrhœa is less; tongue very dry and fissured; there are dry rhonchi over posterior aspect of right lung. She has passed no urine since 7 p.m. yesterday, and there is no distension of bladder. Net weight 88¼ lb.

Fifteenth day. She slept fairly well after a dose of nepenthe. One motion daily for last three days, loose, greenish yellow, acid reaction. She has only passed 10 ounces of urine during the last 24 hours, sp. gr. 1019, acid, albuminous, gives Ehrlich's reaction, and contains 2·2 per cent. of urea. Tongue very dry. There are a few crepitant râles audible over lower lobe of right lung. Pulse 120; respirations 32-36. Her temperature reached 104·8° at midnight. She was sponged, and had one grain of calomel.

Seventeenth day. For the last two days her temperature

has been mostly above 104°, except when brought down by sponging with cold water and vinegar. There is very little cough, but coarse rhonchi are now heard over both lungs. Pulse 116; respirations 36. She has been sick. Motions loose, yellow, and alkaline. Urine scanty, sp. gr. 1024, albuminous, 3·25 per cent. of urea. No ankle clonus; cannot elicit knee-jerk on right side; it is present on left. She is taking nourishment well. Abdomen full, and tympanitic. Ordered ice-bag to be kept constantly applied to abdomen.

Twentieth day. Her temperature has been kept at a lower level, and since the ice-bag was applied has only once risen above 103°. Tongue still very dry and fissured, but not so thickly crusted; no sordes on lips and teeth. Abdomen is less distended. Motions loose, yellow, alkaline, and very offensive. No sickness for last two days, and is now taking lime water with her milk. She complains of pain and stiffness in left arm.

Twenty-third day. Tongue very dry. She complains of pain and stiffness in both legs; no ankle clonus; knee-jerks present; plantar reflexes well marked. Crepitant râles audible over lower lobes of both lungs, and at right base the percussion is impaired. Substitute ten grains of salol for β-naphthol, every four hours.

Thirtieth day. Her temperature has ranged between 100° and 103°, for the last ten days. Her urine has been much more abundant, but is still slightly albuminous; the percentage of urea has ranged from 2 to 2·5; it still gives Ehrlich's reaction well marked. Pulse 120-136; respirations 30-38. The motions are still very offensive. Ordered one drachm of charcoal to to be added to each salol powder.

Thirty-second day. She did not sleep well, complains of pain in right foot and right axilla; in the latter situation there is a glandular swelling. At the junction of the third left costal cartilage with the rib there is considerable inflammatory thickening with tenderness on pressure. Temperature 100°-102°. Pulse 128. Respirations 26. Urine contains a trace of albumen. Motions loose, alkaline, and not so offensive.

Thirty-fourth day. Ordered five grains of quinine each afternoon.

Thirty-sixth day. There has been a decided fall in her temperature, but it still runs up each evening to 101°. Net weight 85 lb., showing a loss of only 3½ lb. in twenty-three days.

Thirty-ninth day. As her temperature still keeps above normal (99° to 101·4°), she was to-day placed in the wet-sheet and ice-bag to abdomen discontinued. Ordered one and-a-half pints of mutton broth daily. A small abscess in right axilla was opened this morning. The periosteal thickening at junction of third left rib with costal cartilage has now almost completely disappeared.

Forty-sixth day. Her temperature has been normal, and wet-sheet is discontinued.

Forty-eighth day. Stop salol, charcoal, and quinine, and give the following mixture:—℞ Ammon. Carb., gr. v. Tinct. Cinchonæ Flav., ℥xxx. Caffeinæ, gr. ii. Aq. Chloroformi, ad ℥i. Every four hours. To have bread and butter, and two eggs daily. Net weight 78 lb.

Fifty-fifth day. For last four days she has had slight rheumatism with effusion in knee-joints, but she is now much better. She is placed to-day on ordinary hospital diet.

March 3rd (sixty-third day). Net weight 83 lb. March 13th, 87 lb. She has been moving about the wards for some time. There was paresis of the extensor muscles of both legs for some time, but that has now disappeared.

March 15th. Discharged quite well.

CASES SYMPTOMATICALLY TREATED.

CASE 34. *Mild case of Typhoid Fever; Cure.*

Evan Jones, aged 18 years, sailor, admitted to hospital January 17th, 1889, with well-marked symptoms of typhoid fever, on the seventh day of illness. Two to five loose motions daily; urine, acid, sp. gr. 1018, albuminous. Temperature 101° to 104°. Ordered milk, lime water, and ice; five grains of naphthaline every four hours. January 26th, two grains of calomel. February 11th, boiled rice. February 14th, minced meat. 18th, chicken. 25th, porridge. On March 4th he was sent to the convalescent home at Woolton for two weeks. He was then quite well, but had not fully regained his strength; Weight 112½lb. On his return from Woolton he was quite well and strong.

CASE 35. *Aborted Typhoid Fever; Ulcerated Sore Throat; Cure.*

Marquis E., aged 38, Spaniard, sailor, admitted to hospital November 17th, 1889, suffering from hæmoptysis. He has had a cough for three days, and has brought up a little clotted blood. He has had a severe headache since the commencement of his illness. There is tenderness in the epigastrium and in the right side. Tongue dry and coated with a brown fur in the centre, appetite bad, bowels confined. There is tenderness and gurgling in right iliac fossa. Spleen enlarged. Temperature 103·4°. Ordered six pints of milk. For four days his temperature ranged between 101° and 104°, the mean of twenty-three observations being 102·2°. The fever aborted on the ninth day. In the beginning of December he had a badly ulcerated sore throat, and was feverish for seven days. He was discharged quite well on December 9th, 1889.

CASE 36. *Typhoid Fever; Cure.*

Margaret A. D., aged 14, admitted to hospital December 23rd, 1889, on the twentieth day of an attack of typhoid fever.

She has had slight diarrhœa from the commencement, the motions being watery and yellow. She is a spare girl, cheeks flushed, pupils dilated, tongue dry in centre. She has a slight cough. Respirations 21. Pulse 84, small and feeble. Temperature 99° to 101°. There are about a dozen rose spots on the abdomen; spleen enlarged. Patellar reflexes normal, ankle clonus well-marked on both sides. Ordered three grains of naphthaline every four hours. Diet; milk and peptonised gruel. Her temperature became normal on the twenty-fifth day (December 28th).

January 7th, 1890. Ordered bread and butter, and milk diet.

January 9th. Two eggs; 15th, ordinary diet. Her weight was not taken on admission, but the following are the records during convalescence. January 3rd, 62½ lb.; 9th, 68 lb.; 18th, 76 lb.; 24th, 76½ lb. Discharged quite well January 28th, 1890.

CASE 37. *Mild case of Typhoid Fever; Cure.*

Ellen B., aged 20, admitted March 11th, 1890. Illness began on 3rd instant with shivering and pain in back, followed by severe headache, which has since continued. Bowels have been confined since the 5th. She is a well developed, well nourished girl. Pupils dilated. Tongue furred and dry in the centre. Sordes on teeth. Appetite poor. Bowels confined. Slight tenderness in right iliac fossa. There are a few well marked typhoid spots. Knee-jerks slight. No ankle clonus. Temperature 101° on admission, but afterwards did not rise above 100°. Ordered six pints of milk. No medicine except two grains of calomel.

March 23rd. One egg; 27th, fish; 28th, two eggs.

April 2nd. Chicken diet.

April 14th. Discharged quite well.

CASE 38. *Mild case of Typhoid Fever; Heart Disease; Cure.*

John R., aged 26, cattleman, admitted March 31st, 1890. He has always enjoyed good health, except for an attack of rheumatism three years ago, with which he was laid up in New York for two months. His present illness began eight

days ago on his way from New York, with headache, diarrhœa and sickness. Bowels have been moved two or three times daily. Motions loose, yellow, and very offensive. Abdomen distended and tympanitic, and tender in umbilical region. Spleen enlarged; can be felt below the ribs. Hepatic dulness increased. There is pericardial friction, and at the aortic cartilage first sound prolonged, at pulmonic cartilage second sound accentuated. Ordered milk diet.

April 1st. Slept badly. Tongue furred but moist. Rose spots on abdomen. Pulse 84, soft and dicrotic. Respirations 16.

April 2nd. Motions very loose, offensive and greenish colour, acid reaction. No fresh spots. Hepatic dulness, $5\frac{1}{2}$ inches in line of axilla; 6 inches in line of nipple, and $5\frac{1}{4}$ inches in mesial line. Splenic dulness 8 by 6 inches. Respiratory phenomena normal, except a few crepitant râles at margins of lungs. Net weight 184 lb. Pulse 112. Three motions.

April 3rd. Slept badly. Tongue dry and furred; motions loose, greenish, very offensive, and acid. Temperature 99° to 101°. Pulse 96.

April 4th. ℞ Quininæ Sulph., gr. ii. Caffeinæ, gr. ii. Fiat pulv. Sig.: one every four hours.

April 8th. Slept well; says he feels better; tongue furred. Pulse 80; splenic dulness rather less; knee-jerks present, tendency to ankle clonus on right side, none on left. Temperature about normal.

April 18th. Ordinary diet.

April 22nd. This patient has greatly improved and is now anxious to get up. Temperature is and has been normal for some time, and digestive functions are in good order. Liver and spleen continue very large. Hepatic dulness $6\frac{1}{2}$ inches in line of axilla and nipple, and $5\frac{3}{4}$ inches in mesial line. Splenic dulness is an irregular oval in shape, measuring $9\frac{1}{2}$ by 6 inches. Cardiac dulness is enlarged, and extends $1\frac{3}{4}$ inches to the right, and 5 inches to the left of the mesial line; deep transverse dulness $6\frac{3}{4}$ inches, vertical $4\frac{1}{2}$ inches. Apex beat rather diffused and can be felt in four or five interspaces, outside nipple line.

There is distinct retraction of third, fourth, and fifth intercostal spaces during systole. Over the greater part of the heart there is a loud grating systolic friction sound, which is especially marked at base and apex, and at the latter situation it is rather high pitched; at the apex the first sound is soft and prolonged but there is no distinct systolic murmur; in the tricuspid area the first sound is dull and accompanied by soft blowing systolic murmur; at the aortic cartilage and propagated into the vessels of the neck there is a short rough somewhat rasping systolic murmur; at the pulmonic cartilage the second sound is accentuated. The veins of the neck are full and pulsate during systole. Pulse 78, soft, and feeble. ℞ Tinct. Digitalis, ♏x. Acidi Nitro-mur. dil., ♏x. Ammonii, Chloridi gr. x. Syrupi, ℥i. Aq. Chloroformi, ad ℥i. Thrice daily after meals.

May 3rd, chop. 14th, net weight 122 lb.

May 15th. Discharged in good condition.

Case 39. *Moderately severe case of Typhoid Fever; Cure.*

Sarah E. W., aged 15, dressmaker, admitted to hospital July 9th, 1890. She has always been a delicate girl and has suffered from rheumatism. She menstruated about four weeks ago for the first time. Her present illness began on Monday, June 30th., with pains in the head and neck; on Tuesday she felt worse, but went to work; she had several shivering fits and pains all over her body. Since Wednesday she has been confined to bed. She has had three or four loose motions daily.

She is a delicate-looking, small, but well formed, girl. She complains of headache, and pains in her legs and body. Lips very dry and covered with sordes. Tongue very dry and furred. There are numerous typhoid spots on chest and abdomen. Splenic dulness, $4\frac{3}{4}$ by $4\frac{1}{2}$ inches. Hepatic dulness increased. Heart healthy. There are a few crepitant râles over right lung, but otherwise respiratory phenomena normal. Knee-jerks feeble; no ankle clonus. Temperature, 103°. Ordered 4 pints of milk, boiled rice and tapioca, and two lemons. Naphthaline, gr. v., every four hours.

July 10th (eleventh day). She passed a restless night.

Pulse 116; respirations 26. Temperature, 101° to 103°; mean 102° She had, to-day, eight loose, greenish, motions; urine acid, sp. gr. 1017, albuminous.

July 11th. She did not sleep well, but is rather better this morning. Tongue not so dry. Pulse 112; respirations 34. Temperature, 100° to 103°; mean 101·3°. Four loose, greenish, offensive motions.

July 12th. Slept fairly well, after a dose of nepenthe. Pulse 116; respirations 32. Temperature, 102°. Three loose offensive motions. Net weight, 73 lb.

July 13th. Temperature, 102° to 103·6°; mean 102·4°. Pulse 124. Urine acid, sp. gr. 1015, a trace of albumen. One formed yellow motion.

July 14th. She had a better night. There are a few bronchitic râles over chest. Knee-jerks better marked. She had an enema this morning, and it was followed during the day by six loose motions.

July 17th. Dry rhonchi heard over chest; she is coughing a little, but there is no expectoration. Tongue clean and moist, and she is taking nourishment well. Pulse 116; respirations 38. Temperature, 100·6° to 102·6°. Two characteristic typhoid stools. Knee-jerks present; ankle clonus on right side.

July 21st. She was delirious yesterday afternoon, and tried to get out of bed. Her bowels were confined, but she has had an enema this morning, followed by a free evacuation. She slept well last night, and feels better to-day. Tongue clean. Her temperature became practically normal on the 23rd, but a slight evening rise continued till the thirtieth day of the disease.

On July 25th her net weight was 64 lb., showing a loss of 9 lb. in 13 days. The progress of the case from this time was uninterrupted, but she continued to lose weight until August 8th, when 58 lb. were recorded.

On August 5th, she was ordered a pint of strong beef tea, and on the 7th, fish diet.

On August 15th, she weighed 64 lb., on 21st, 68 lb., and on

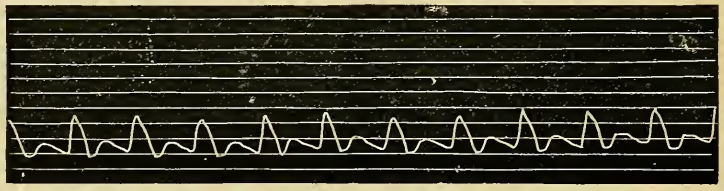
27th, 75 lb. On the 18th, she was ordered a lightly boiled egg daily. During this month her bowels were confined, seldom opened except by enemata. Motions alkaline in reaction.

On the 27th the urine was noted as free from albumen.

On September 5th her net weight was 77½ lb., and on the 8th she was discharged quite well.

Case 40. *Typhoid Fever; Cure.*

Hans H., aged 21, Norwegian sailor, admitted to hospital July 15th, 1890. He was unable to speak English, and no history of his illness was obtained, but judging from the condition of the patient and the after progress of the case, the stage of his disease may be fixed as the end of the second week when admitted. His tongue was dry. Motions loose, yellow, and alkaline. Over the chest and abdomen there were numerous lenticular spots which disappeared on pressure. Pulse dicrotic. Heart sounds normal; apex beat in fourth interspace, and there was retraction of the intercostal spaces during systole. Bronchitic râles over chest. Spleen enlarged. Knee-jerks and ankle clonus present. Temperature 102° to 103°. Pulse 88. Respirations 28. Urine alkaline sp. gr. 1027, a trace of albumen.



H. H., 15-7-90 ; Pulse 88 ; Pressure 1 oz.

He was ordered four pints of milk, and boiled bread and milk. β-naphthol, gr. vi, every four hours. He was occasionally delirious for the first week in hospital. His temperature was practically normal from July 23rd, though there was an evening exacerbation till the 26th.

On August 4th, he was ordered fish diet, and on the 6th, chicken. He was not weighed till the 12th, when he was 136 lb., and on the 23rd 138 lb. He was discharged quite well on August 27th.

CASE 41. *Typhoid Fever; Cure.*

Antonio P., aged 25, fireman, admitted to hospital, July 19th, 1890. He is a Spaniard, and unable to speak English, but a history was obtained of twelve previous days illness. He is now very weak. Tongue dry and furred in centre, clean at tip and edges. Pulse 96. Respirations 30. Motions offensive, liquid, brownish, and alkaline in reaction. On chest and abdomen there are a few well marked typhoid spots. Abdomen not distended nor tender. Spleen 6 by 4 inches. Knee-jerks not well marked. There is a tendency to ankle clonus. Urine slightly albuminous. Heart sounds very feeble at apex. There are a few crepitant râles over back of chest. Net weight 137 lb. Ordered four pints of milk and boiled bread and milk. β-naphthol, gr. vi, every four hours.

After the second day in hospital his temperature did not rise above 101°, and on the twentieth day of his illness it became normal.

On August 6th (thirty-first day), he was ordered fish, and on the 9th, chicken. On the 12th his net weight was 134 lb. He was discharged, quite well, on August 18th.

CASE 42. *Severe case of Typhoid Fever; Relapse; Cure.*

Elizabeth Anne S., aged 8, admitted to hospital July 19th, 1890. She has had measles, scarlatina, and chicken pox. Her present illness began on the 13th instant, with sickness, and since then she has vomited after all the food she has taken. Her bowels have been rather confined, but after an aperient the motions were liquid, and of a brownish colour.

Present condition. Temperature 104·2°. Pulse 126. Respirations 28. She complains of frontal headache, and thirst. Tongue dry, and furred, Heart and lungs healthy. Spleen enlarged. No abdominal pain or tenderness. Feet rather cold. Knee-jerks present, no ankle clonus. Ordered three pints of milk daily, and one drachm of Liq. Ammoniæ Acetatis, every three hours.

July 20th (eighth day). She slept fairly well. Temperature at 8 a.m. 103°. After an enema she had a liquid, yellow, alkaline motion.

July 22nd. She has been rather restless and delirious. She has been sick. Motion after enema, loose, yellow, alkaline, and offensive. One or two rose spots found on upper part of right thigh. Ordered 2 grains of naphthaline every four hours; and 1 grain of calomel at once.

July 23rd. Temperature 101° to 102·8°. Pulse 124. Respirations 30. Tongue very dry. Respiratory murmur over right lung is very feeble, especially at base where the percussion note is impaired. The abdomen is distended and tympanitic. Ordered a turpentine stupe. She presented a continuous febrile temperature, ranging from 101° to 103°, till the fifteenth day of the illness, after which there was a considerable morning remission, and on the twentieth day it became normal. Her bowels were usually confined, and she had frequently enemata, and small doses of calomel. Her pulse fell to 100°, and her temperature remained normal to the twenty-fourth day, when there was an evening exacerbation, which continued to increase till the twenty-seventh day (fourth day of relapse), when it reached 104·4°. The relapse lasted fourteen days. On the eighth day of the relapse she was ordered peptonised gruel, and the following mixture in place of naphthaline. ℞ Caffeinæ, gr. i. Sodæ Sulpho-Carbolat., gr. xv. Tinct. Cinchonæ Flav., ℥ss. Syrupi, ℥i. Aq. ad ℥ss. To be taken every four hours. During last few days of relapse iced compresses were applied to abdomen.

On August 26th, after her temperature had been normal for eight days, she was placed on fish diet; on September 4th, ordered chicken; and on 7th, two eggs. She was not weighed on admission, but the following are the net weights during convalescence:—August 24th, 35½ lb.; 29th, 38 lb.; September 5th, 44½ lb.; 12th, 43½ lb.; 19th, 46½ lb. Discharged quite well on September 24th, 1890.

Case 43. *Mild case of Typhoid Fever; Cure.*

Mabel W., aged 10, admitted to hospital July 19th. The present illness began on the 7th inst. with headache. She is now weak and much emaciated. Her bowels have been rather

confined, but after an enema the motion was liquid, brown, alkaline, and offensive. One rose spot on abdomen disappearing on pressure. Knee-jerks present, no ankle clonus. Heart sounds normal. Lungs healthy, except for a few dry rhonchi, and there is slight cough. The fever abated on the fourteenth day (July 21st). She then weighed 33 lb. On August 15th, 42 lb.; 22nd, 43½ lb.; 29th, 46 lb.; September 5th, 46 lb.

Her diet at first consisted of milk, boiled bread and milk, and butter. Afterwards of arrowroot, lightly boiled eggs, fish, and chicken. She was discharged quite well on September 8th.

CASE 44. *Mild case of Typhoid Fever; Cure.*

Agnes T., aged 42, housewife, admitted to hospital July 24th, 1890. She is a married woman and the mother of four children, the eldest, a boy of eight, is at present in Netherfield Road fever hospital with typhoid fever, the youngest is 18 months old, and has just been weaned. Her present illness began fourteen days previously with headache, pains in her body, vomiting and diarrhœa. For the last week she has been under the care of Dr. Permewan, who sent her to hospital. She is now suffering from headache, sleeplessness. Tongue furred; motion liquid, yellow, and alkaline. Spleen enlarged; no abdominal distension, but there is much tenderness, no rose spots found. Knee-jerks present, no ankle clonus. Temperature 100° to 102°. She was placed on bread and milk diet, and ordered six grains of naphthaline every four hours. During convalescence she was ordered fish and chicken. On August 21st she was ordered a mixture of nux vomica and hydrochloric acid. She was not weighed on admission, but the following records were made:—August 22nd, 112 lb.; 29th, 117 lb.; September 5th, 117 lb. Discharged this day quite well.

CASE 45. *Typhoid Fever; Cure.*

Mary G., aged 13, admitted to hospital September 8th, 1890. She is a bright, intelligent child. Says she took ill on the 1st instant, with headache. She has been in bed since the 2nd,

and has suffered from sickness, headache and diarrhœa. She has been under the care of Dr. Swift, of the North Dispensary, who sent her to hospital. She now complains of slight headache and weakness. Her face is flushed, eyes bright, pupils dilated. She is thirsty, and has no appetite. Tongue dry, red, and glazed. Motions loose, yellow, and alkaline. Pulse 104, soft and compressible. Heart and lungs healthy. Splenic dulness increased. Abdomen distended and tympanitic. Knee-jerks well marked. No ankle clonus. Ordered four pints of milk and peptonised bread and milk.

September 9th (ninth day). She slept well, but has a slight headache this morning. Motions pale yellow, loose, offensive, and alkaline. There are a few rose spots on abdomen. Pulse 108. Temperature 99·2° to 103°. Tongue dry and glazed. Urine gives a deep red colour with Ehrlich's test. Net weight 51 lb.

On the 11th, she was ordered five grains of naphthaline every four hours. She progressed very favourably, and her temperature remained normal after the twenty-first day.

On the 19th, she weighed 54 lb., showing a gain of 3 lb. during the first eleven days in hospital, *i.e.* during the second half of the fever. September 26th; net weight 54 lb. September 29th; fish diet. October 3rd; weight 54½ lb.; 6th, chicken; 10th, weight 61 lb; 14th, net weight 66 lb.

Discharged well and strong on this last day.

Case 46. *Typhoid Fever; Cure.*

Sarah D., aged 19, housewife. She and two of her brother's children, who live two doors from her residence, were admitted to hospital, October 1st, all suffering from well marked symptoms of typhoid fever. It is rather difficult to fix the commencement of her illness, as she has been ailing for some time. Five weeks ago she got badly crushed in a crowd, and afterwards suffered from diarrhœa for a fortnight. About thirteen days ago she took to bed with what was supposed to be inflammation of the lungs, for which her chest was poulticed. About a week ago a rash appeared on her abdomen, and about that time the diarrhœa ceased.

We received her temperature record as taken by the District Nurse, from September 24th. From the 24th to the 28th it ranged from 103° to 105°; on the latter day she was sponged, and had a dose of antipyrim, and it did not afterwards rise above 102·6°; mean 101·8°.

She has been married seven months, and is a well-developed woman; dark complexion; flushed face; bright eyes, pupils dilated; and expression anxious. Tongue dry and furred. She has a troublesome cough, and scanty expectoration. Pulse 112, soft, weak, and small. Heart's sounds clear. There are numerous cooing râles all over the chest. There are numerous lenticular rose spots over the abdomen, which is distended. There has been very little diarrhœa since she took to bed. After an enema she had three loose, yellow, alkaline, motions. She was ordered 4 pints of milk, 12 ounces of bread, and a cough mixture.

October 2nd. Yesterday evening her temperature reached 102·6°, but has fallen this morning to 99°. There is marked muscular tremor about the mouth, and in the lower limbs. Knee-jerks present; ankle clonus well marked on left side. Urine alkaline, sp. gr. 1019, slightly albuminous, and with Ehrlich's test gives a deep port wine colour. Net weight 109 lb. On October 4th her temperature became normal; 14th, net weight, 111 lb. She was discharged quite well on October 22nd.

Case 47. *Typhoid Fever; Cure.*

Thomas K., aged 13, nephew of the last patient, and son of the woman who was afterwards received and died (Case 21). Admitted October 1st., about the end of the second week of illness. He is a poorly nourished boy with a languid listless appearance. Tongue moist but furred. Pulse quick and feeble. Skin hot and dry. Pupils dilated. Heart's sounds clear. There are numerous rhonchi all over chest. Knee-jerks present; marked ankle clonus, especially on left side. Temperature, 101° to 102·4°. Urine gives a deep purple colour with Ehrlich's test. Net weight 53½ lb. Milk 4 pints,

and 8 ounces of bread. Six grains of periodate crystals every four hours.

His temperature became normal on October 7th. 10th, ℞ Caffeinæ, gr. i. Tinct. Cinchonæ Co., ♏x. Aq. Chloroformi, ad ℥i. Every four hours. 14th, net weight 52 lb. 20th, fish diet. 24th, weight 56 lb. Discharged quite well on October 27th.

CASE 48. *Heart Disease; Typhoid Fever; Cure.*

Edward M., aged 6, admitted October 4th, 1890. About nine months ago he got a severe attack of rheumatic fever, with which he was confined to bed for seventeen weeks, and has not been well since. His present illness began about ten days ago, with headache and pains in the abdomen. He has been confined to bed since September 28th, and on the 29th he had a severe attack of epistaxis. He has had about three loose, yellow motions each day. He is a well nourished child, but rather anæmic. Tongue furred in centre, papillæ enlarged. Motion yellow, acid, and offensive. Temperature 100° to 102°. Pulse 104, visible pulsation in vessels of neck, veins full. There are well marked mitral systolic, and aortic systolic and diastolic murmurs. At the bases of lungs there is impaired percussion with feeble breath sounds. Urine gives Ehrlich's reaction. Net weight 37½ lb. Ordered 3 pints of milk, and boiled bread and milk, with extract of malt; 5 grains of β-naphthol, every four hours.

October 6th. Heart's sounds almost inaudible, there are double aortic murmurs, and a systolic murmur at the apex.

October 14th. Weight 36½ lb.; 24th, 37 lb.

October 25th. Discharged, quite well from the typhoid fever, and in fair general health.

CASE 49. *Mild case of Typhoid Fever; Cure.*

Mary Ellen T., aged 23, worker in belt factory. She says about five years ago she was in Netherfield Road Hospital with fever. Since that time she has suffered from constipation, her bowels being only moved every three or four days. Her present illness began eleven days ago with headache, and

vomiting, the latter sympton lasted for three days, and the headache still continues. She also felt pains in her back and legs, and has had about three watery motions each day. She has been confined to bed for the last eight days, and attended by Dr. Permewan, who sent her in here. Temperature 104°. Pulse 92.

October 9th (twelfth day). She passed a restless night, and did not sleep at all, she is languid and heavy this morning. Face rather pale and relieved by malar flush. Eyes heavy, but glistening, complains of headache. Tongue moist, coated with white fur. Sordes on teeth and lips. She is very thirsty. She speaks in a dull apathetic tone, and is very deaf. Skin hot and dry. Abdomen rather distended. Splenic dulness, $5\frac{3}{4}$ by $4\frac{1}{8}$ inches. There is no rash. There are well marked linæ gravidarum, she gave birth to a child five years ago. Net weight 107 lb. Ordered 4 pints of milk, and 12 ounces of bread, and 2 ounces of butter. Six grains of β-naphthol every 4 hours. She passed through an uneventful attack of typhoid fever, and her temperature became normal on the twentieth day. After this her bowels became confined, and she required frequent doses of calomel, and enemata. On the twenty-third day the naphthol was stopped, and she was ordered a mixture of caffeine, and cinchona.

Twenty-eighth day, Net weight 104 lb. Thirtieth day, she was placed on fish diet.

October 31st. Weight 105 lb.; November 7th, 108 lb. Ordinary diet. Discharged November 10th quite well.

Case 50. *Mild case of Typhoid Fever; Cure.*

Margaret McM., aged 13, domestic servant, admitted to hospital October 9th, 1890. Her illness began on the 2nd inst. with headache and drowsiness. Since the 4th she has had diarrhœa, about eight motions daily, and on the 5th pain began in the back and abdomen. Her appetite is bad; tongue large, flabby, coated with a white fur, moist, and tremulous. Over the trunk there are about a dozen elevated rose spots disappearing on pressure. Respirations 16. Pulse 116, fair tension.

Face pale, eyes suffused. Net weight 64 lb. Ordered six pints of milk.

October 11th. She is rather better, the headache and pain in the back have disappeared. Pupils large, tongue moist. There are ten more rose spots to-day. Respirations 13. Pulse 112. Temperature 99° to 101·6°.

October 12th. Four or five fresh spots on the trunk; bowels moved twice after three grains of calomel. Respirations 17. Pulse 108.

October 14th. Boiled bread and milk.

October 17th. Net weight 64 lb. 19th, patient steadily improving. She sleeps well and takes her food well. Tongue much furred. The epigastric and abdominal reflexes are very active. Knee-jerks not exaggerated, slight ankle clonus. Plantar reflexes almost absent. 25th, weight 64 lb. 29th, one egg.

November 8th. Net weight 72 lb. 11th, ordered Blaud's pills. 15th, 74¼ lb. 18th, discharged in good condition.

Case 51. *Mild case of Typhoid Fever; Cure.*

Michael B., aged 19, painter, admitted to hospital November 3rd, 1890, with typhoid fever of about ten days duration. He has been confined to bed for last nine days, and has been attended by Dr. Price. On admission the fever was mild, but there was ankle clonus on both sides. Net weight 104 lb. His treatment in hospital consisted of four grains of β-naphthol every four hours, and during convalescence a mixture of caffeine, cinchona and strychnine. He was put on fish diet on November 11th, and on ordinary diet November 19th. He was discharged quite well November 26th.

Case 52. *Typhoid Fever; Salivation; Cure.*

Mary B., aged 29, married, admitted to hospital November 5th, 1890, on her arrival from New York. She aborted in August, and since then has been in bad health, and was returning to England for the benefit of her health. About five weeks ago she had an attack of diarrhœa, which lasted

ten days. Her present illness began three days after leaving New York with diarrhœa, which has since continued, so that we reckoned the day of admission as the sixth day of illness. Her temperature on admission was 99·6°; on the seventh day day it reached 102·6°; and on the eighth day 103·6; the mean temperature of 18 records on the eighth, ninth, and tenth days was 102·6°. Pulse 120, small, and compressible. Tongue dry but clean; breath offensive. Bowels acted three times on the seventh day after a dose of castor oil. Motions liquid, alkaline, and offensive. Abdomen distended. Hepatic dulness extends one inch below margin of ribs. Splenic dulness increased, no pain or tenderness. Heart and lungs healthy. No ankle clonus. Net weight 92 lb. Urine acid, sp. gr. 1012, a trace of albumen, and Ehrlich's test gives a deep ruby colour. She was ordered bread and milk diet, and ten grains of naphthaline every four hours.

November 10th (eleventh day). She complains of severe pains in feet and ankles. Tongue dry, furred in the centre, and clean at the tip and edges. There was considerable abdominal distension yesterday, and she received two grains of calomel. Bowels acted well this morning: motion formed, yellow, acid, and very offensive. Pulse 112. Temperature 101° to 102·6°.

From the fifteenth day there were marked morning remissions, but her temperature did not become normal till the twenty-sixth day.

On the twenty-ninth day the naphthaline was stopped, and she was ordered a mixture of caffeine and cinchona. Her net weight was then 87 lb., showing a loss of 5 lb. in 21 days. Her bowels were rather constipated throughout, and she had frequent doses of calomel; the total quantity given up to December 2nd was 37 grains. It was then noticed that she was presenting distinct signs of salivation. A gargle of peroxide of hydrogen was ordered, and, afterwards, one containing chlorinated soda.

December 4th. There is marked ulceration along the gums of both upper and lower jaws, and of the cheeks opposite the

teeth. On the internal surface of the lower lip, and on the mucous membrane of the buccal cavities, there is a very extensive exudation of a tough leathery membrane of a distinctly diphtheritic appearance. Breath very offensive. ℞ caffeinæ, gr. ii. Tinct. Cinchonæ flav. ℥xxx. Potassii Chloratis, gr. xv. Potassii Iodidi, gr. v. Aq. ad ℥i. Draught to be taken every four hours. Ordered gruel and green vegetables.

The ulcers soon showed signs of healing. On December 27th, she was placed on fish diet, and on ordinary diet, January 12th, 1891. January 2nd, net weight 91½ lb.; 9th, 97 lb. Discharged quite well on January 15th, 1891.

Case 53. *Typhoid Fever; Cure.*

Thomas J., aged 9 years, admitted to hospital, January 5th, 1891. His mother says that he took ill a fortnight ago with headache and chilliness, and for the past week he has been confined to bed. He has been very thirsty and has had two loose, yellow motions daily. Temperature to-day 103° to 104°. Net weight 45 lb.

January 6th (fifteenth day). He passed a very restless night, was delirious and got out of bed several times, and slept very little. He is now quite conscious. Face flushed. Eyes bright. Pupils medium size. Tongue dry, coated with a thick brownish fur in centre, and transversely fissured. Lips and teeth covered with sordes. There has been slight epistaxis. He had one grain of calomel last night and an enema this morning, and during the day he had three loose, yellow, alkaline very offensive motions. Urine passed involuntarily. Heart's sounds clear. Pulse 112, small and soft. There are dry bronchitic râles all over chest, and at bases the percussion is impaired and there are crepitant râles. He is much troubled with cough, but no expectoration. Abdomen is distended, tympanitic, and tender on pressure. Splenic dulness increased. There are numerous elevated rose spots on chest and abdomen. Cannot elicit knee-jerk on left side, present but not well marked on right side. No ankle clonus. Ordered three pints of milk

and six ounces of bread. β-naphthol, gr. vi., every four hours.

January 7th. He had a much better night. Pulse 124, not so compressible. Motions of a pea-soup character. Ankle clonus present on left side. Temperature 102° to 103°. Urine gives a light ruby colour with Ehrlich's test.

After the fifteenth day the temperature did not at any time exceed 101°, and it became normal on the twenty-fifth day, and afterwards remained so. He had usually about one loose alkaline motion each day.

On January 23rd (twenty-eighth day), net weight 42 lb. The naphthol was stopped, and the following mixture ordered. ℞ Tinct. Cinchonæ Co, ℥i. Tinct. Belladonnæ ♏v. Aq. Chloroformi, ad ℥i. Draught thrice daily.

January 26th. Fish diet; 30th, net weight 44 lb. February 6th, net weight 48 lb.; 7th, ordinary diet; 14th, net weight 53 lb.: 20th, 56 lb.: 23rd., 56 lb. Discharged this day quite well.

Case 54. *Typhoid Fever; Cure.*

Alice J., aged 5, sister of the last patient, admitted January 23rd, on the 9th day of illness. She is a fairly well nourished, and apparently healthy child. She is very apathetic. There is a pink flush on both cheeks. Pupils dilated. Lips dry, brown and cracked. Sordes on teeth. Tongue dry, glazed and red, with epithelium slightly denuded. She is troubled with a slight cough, and there are a few dry bronchitic râles over chest. Pulse 144. Abdomen distended and tympanitic. Spleen large. There are a few rose spots on chest and abdomen. Motions loose, yellow, alkaline, and offensive. Knee-jerks present. No ankle clonus. Net weight 40 lb. Diet: three pints of milk and three ounces of bread. ℞ Salol, gr. v, every four hours.

There were considerable daily fluctuations of temperature, the range being usually from 100° to 103°, and on the twenty-first day it became normal. There was a considerable amount of diarrhœa, and the urine gave Ehrlich's reaction. On the

twenty-fourth day, the salol was stopped, and she was ordered a grain of caffeine and 15 minims of tincture of cinchona every four hours. On the twenty-sixth day, she weighed 38 lb. On the twenty-seventh day (February 10th), placed on fish diet.

February 19th, ordinary diet, one egg, and one pint of milk.

February 20th, weight 40½ lb.; 23rd, discharged quite well.

Case 55. *Typhoid Fever; Cure.*

Arthur J., aged 20 months, admitted to hospital January 27th, 1891. This is one of four children of the same family at present in this hospital with typhoid fever. His illness began four days previously, and he is now very drowsy and apathetic. Heart and lungs healthy. Pulse 132, moderately strong. Temperature 103·8°. A few suspicious typhoid spots on chest and abdomen. Abdomen distended. He has not been weaned. Net weight 29 lb. Knee-jerks present, but not easily elicited. No ankle clonus. Ordered two pints of milk; salol, three grains every four hours. There were considerable daily fluctuations of temperature, and after the eighth day it seldom rose above 101°, and it became normal on the fourteenth day. Discharged quite well, February 5th, 1891. Net weight 30 lb.

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